VPDES PERMIT PROGRAM FACT SHEET

This document gives pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **Major, Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. The discharge results from the operation of a sewage treatment plant. This permit action consists of updating boilerplate language, addition of an E. coli limitation, and a change in the monitoring frequency for BOD_5. SIC Code: 4952

1. Facility Name and Address:

Martinsville Water Pollution Control Plant
55 West Church St.
P.O. Drawer 1112
Martinsville, VA 24114

Location: 801 Wind Dancer Lane, Ridgeway, VA 24148

2. **Permit No. VA0025305** Expiration Date: February 20, 2009

3. Owner Contact: Name: Mr. John Dyches
Title: Water Resources Director
Telephone No.: (540) 656-5157

4. Application Complete Date: August 7, 2008
Permit Drafted By: Kevin A. Harlow Date: January 5, 2009
DEQ Regional Office: West Central Regional Office
Reviewed By: _____ Date:
Public Comment Period:

5. Receiving Waters Classification:
Receiving Stream: Smith River
Basin: Roanoke River Subbasin: Roanoke River Section: 3g
Class: IV Special Standards: None
7-Day, 10-Year Low Flow (7Q10): 90 MGD 1-Day, 10-Year Low Flow (1Q10): 25 MGD
30-Day, 5-Year Low Flow (30Q5): 122 MGD Harmonic Mean Flow (HM): 194 MGD
30-Day, 10-Year Low Flow (30Q10): 107 MGD
High Flow months: January through June
Tidal? No On 303(d) list? Yes

See the Flow Frequency Memorandum included as **Attachment C** for additional information regarding the development of the critical flow.

6. Operator License Requirements: I

7. Reliability Class: II

8. Permit Characterization:

( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW

(X) Possible Interstate Effect ( ) Interim Limits in Other Document

9. Wastewater Treatment System Description:

See flow diagram in **Attachment A**.

The 8.0 MGD Martinsville wastewater plant treats primarily domestic sewage from the City of Martinsville and surrounding areas and discharges treated wastewater at Outfall 001 to the Smith River. The treatment works also receives additional influent from the closure of the Henry Co. PSA Upper Smith River STP. A brief description of the treatment processes follows.

Wastewater Treatment Processes
Influent Monitoring - parshall flume.
Primary Treatment - two circular primary clarifiers.
Secondary Treatment - extended aeration with cationic and anionic polymer addition for color and toxicity removal.
Secondary Clarification - three secondary clarifiers.
Disinfection - chlorination.
Dechlorination - sodium bisulfite.
Post Aeration.

Biosolids Treatment Processes
Grit Separation - grit separators are located at the primary clarifiers.
Sludge Thickening - two gravity thickeners that receive sludge from the primary and secondary clarifiers and from the chlorine contact tank.
Sludge Stabilization - four aerobic digesters.
Sludge dewatering - two belt filter presses.
Final disposal - hauled by truck to the landfill.

10. Sewage Sludge Use or Disposal:

A Sludge Management Plan was submitted for this facility with the permit application. The facility will continue to aerobically digest the sludge, dewater it with a belt press. The dewatered sludge is transferred by First Piedmont Waste Removal & Disposal (or other entity identified in the current SMP) to the Republic Services, Inc., Upper Piedmont Environmental Landfill in Rougemont, NC.

11. Discharge(s) Location Description:

Name of Topo: Martinsville East (See **Attachment B.**)
Latitude: 36° 38' 46.1" Longitude: 79° 50' 9.5"

A description of the outfalls is included in **Table I.**

12. Material Storage:

Chlorine in gas cylinders and sodium bisulfite is stored onsite in locked storage sheds.

13. Ambient Water Quality Information:

Memoranda or other information which helped to develop permit conditions (special water quality studies, STORET data, and any other biological and/or chemical data, etc.) are listed below.

Flow records are available from a continuous record gauge (#02072000) on the Smith River near Philpott, Virginia, from a continuous record gage (#2072500) on the Smith River near Bassett, VA, and from a continuous record gage (#2073000) on the Smith River near Martinsville, VA. The flow frequencies at the discharge point were calculated by adding the incremental flow from the additional drainage area downstream from gage #2073000 to the critical flows at that gage.

See **Attachment C** for a copy of the Flow Frequency Memorandum for a summary of the flow frequencies.

Background temperature, pH, and hardness data are available for STORET Station 4ASRE022.71. This station is located on the Smith River at the footbridge above the Martinsville City STP. The 90th percentile pH and temperature values were derived from data collected from 1988 through 2001. **Attachment E** contains the STORET data.

The permittee discharges into the Smith River in the Lower Smith River Watershed (stream segment VAW-L54R_SRE05A00). As described in the 2006 DEQ Impaired Waters Report (**Attachment E**), the Martinsville City STP discharges within a 20.06 mile segment of **bacteria impaired waters**, Cause Group ID: L54R-01-BAC and within a 13.77 mile segment of **benthic impaired waters**, Cause Group ID: L54R-01-BEN.

14. Antidegradation Review and Comments:

Tier I _X_ Tier II _____ Tier III _____

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier I or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier II water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier II waters

is not allowed without an evaluation of the economic and social impacts. Tier III water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The Smith River in this segment (VAW-L54R) is listed on Part I of the 303(d) list for exceeding the General Standard (benthic), as well as for exceeding the bacteria standards, and is therefore determined to be a Tier I water. The discharge from the Martinsville STP has been assigned a bacteria wasteload allocation in the Bacteria TMDL Development for the Dan river, Blackberry Creek, Byrds Creek, Leatherwood Creek, Marrowbone Creek, North Fork Mayo river, South Fork Mayo River, Smith River, Sandy Creek, and Sandy River Watersheds. The benthic TMDL study has not been completed.

The limitations in this permit were developed in accordance with § 303(d)(4) of the Clean Water Act. Therefore, antidegradation restrictions do not apply.

Water quality based effluent limits for pH, total residual chlorine (TRC), and E.coli have been established in compliance with antidegradation requirements set forth in 9 VAC 25-260-30 of the water quality standards regulations. In accordance with antidegradation policy, pH, TRC, and E. Coli limits for the discharge have been established to just meet the water quality standards in the Smith River.

15. Site Inspection: Date: 2/8/2007 Performed by: Ryan Hendrix

The site visit memo is in **Attachment D**.

16. Effluent Screening & Limitation Development:

DEQ Guidance Memorandum 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq). **Attachment E** contains data from STORET Station 4ASRE022.71 used to calculate the 90th percentile values for pH and temperature. Refer to **Attachment F** for the wasteload allocation spreadsheet and effluent limit calculations. See **Table II** for a summary of effluent limits and monitoring requirements.

A. **Reduced Monitoring:**
All permit applications received after May 4, 1998, are to be considered for reduction in effluent monitoring frequency. GM 98-2005 states that "only facilities having exemplary operations that consistently meet permit requirements should be considered for reduced monitoring." No effluent monitoring has been reduced in this permit issuance because the permittee received Warning Letters W2008-07-W-1003, W2008-02-W-1002, W2007-11-W-1026, W2007-03-W-1006, W2007-01-W-1009, and W2006-05-W-1005.

B. **Mixing Zone**
MIX.EXE was run to determine the percentage of the receiving stream flow that could be used in the wasteload allocation calculations. The program output indicated that 100 percent of the 7Q10 and 100 percent of 30Q10 may be used for calculating chronic wasteload allocations (WLAs) but only 19.84% of the 1Q10 may be used for calculating acute WLAs. A copy of the print out from MIX.EXE is enclosed in **Attachment F**.

C. **Effluent Limitations**

Flow -- Flow is to be monitored continuously using a totalizing, indicating, and recording flow meter. This sample type and frequency is recommended by the VPDES Permit Manual (2001) for municipal facilities with design flows > 2.0 MGD. The flow monitoring is unchanged from the current permit.

pH -- The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum are required. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class IV receiving waters and are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall be collected once per day of discharge. No changes to the current limits for pH are proposed for this reissuance.

Total Suspended Solids (TSS) -- The Total Suspended Solids limits are technology-based secondary treatment standard limits and are unchanged from previous permit. No changes to the current limits for TSS are proposed for this reissuance.

Biochemical Oxygen Demand (BOD_5) -- The current permit contains water quality based limits for five day biochemical oxygen demand (BOD_5) and dissolved oxygen. The BOD_5 limits of 22.5 mg/l and 681 kg/d monthly average and 33.8 mg/l and 1022 kg/d max weekly average are in accordance with the Roanoke River Basin Water Quality Management Plan (303(e)) as amended. See **Attachment G** for a copy of the historical limit development. The permittee requested a reduction in monitoring frequency for BOD_5. The DMR data in **Attachment F** shows that the average and maximum weekly and monthly average BOD_5 concentrations are significantly less than permit limitations. Also, the sampling schedule table in the VPDES Permit Manual recommends BOD_5 be monitored 5-7 days/week for >2.0 MGD facilities. Based upon this information the monitoring frequency is reduced as requested. No changes to the current limits for BOD_5 are proposed for this reissuance, however, the monitoring frequency is reduced to 5 days per week.

Dissolved Oxygen - The dissolved oxygen minimum of 6.0 mg/l is based on the effluent input value used in developing the BOD_5 limits. See **Attachment G** for a copy of the historical limit development. No changes to the current limits for dissolved oxygen are proposed for this reissuance.

E. Coli – A new E. coli monthly average limit, calculated as a geometric mean, of 126 N/100ml has been added to the permit. Monitoring will be performed twice per month in order to calculate the geometric mean. In accordance with 9 VAC 25-260-170, all sewage discharges shall disinfect to achieve the applicable bacteria concentrations prior to discharge. Previously DEQ has allowed the use chlorine disinfection monitoring requirements as a surrogate for E. coli. However, the EPA has questioned whether this is appropriate, especially for major permits. Therefore, the new E. coli limit, equal to the water quality standard, is added. Additionally, the new E. coli limit is required to demonstrate compliance with the bacteria wasteload allocation assigned to the facility in the Dan River Bacteria TMDL, VAW-L54R-01 (approved December 8, 2008). The

TMDL (excerpted in **Appendix F**) states that "For this TMDL, the wasteload allocation for permitted facilities is to maintain discharge at the design flow limits and bacteria concentrations at their permitted levels of 126 cfu/100mL." Compliance with the new E. coli limit and Part I.C.1 – 95% Capacity Reopener ensures compliance with the bacteria wasteload allocation of 3.82E+10 cfu/day or 1.39E+13 cfu/year.

Total Residual Chlorine -- The current permit limits for TRC are 17 µg/l max weekly average and 14 µg/l monthly average. Due to a slight increase in the 1Q10 and 7Q10 for the Smith River at Outfall 001, a weekly average of 130 µg/l and a monthly average of 31 µg/l are protective of the Water Quality Standards. However, antibacksliding prevents a relaxation of the limits. No changes to the current limits for TRC are proposed for this reissuance.

D. **Toxics Screening**

Ammonia -- Ammonia was evaluated for the reasonable potential to exceed the instream standards using the procedures outlined in Guidance Memo 00-2011. See **Attachment F** for a copy of the spreadsheet that calculates the wasteload allocations for ammonia and a copy of the reasonable potential analysis output. In accordance with these procedures, no limit is required.

Other Toxics – Copper and Zinc were the only WQS monitoring parameters that had at least one sample with a detectable concentration. See **Attachment F** for a copy of the spreadsheet that calculates the wasteload allocations and a copy of the reasonable potential analysis output. No limit is required for these substances.

17. Basis for Sludge Use & Disposal Requirements:

A Sludge Management Plan was submitted for this facility with the permit application. The facility will continue to aerobically digest the sludge, dewater it with a belt press. The dewatered sludge is transferred by First Piedmont Waste Removal & Disposal (or other entity identified in the current SMP) to the Republic Services, Inc., Upper Piedmont Environmental Landfill in Rougemont, NC.

18. Antibacksliding Statement:

All limits in this reissuance are at least as stringent as the limits in the previous permit. Therefore, this permit issuance complies with antibacksliding requirements.

19. Compliance Schedules:
No compliance schedules are included in this permit.

20. Special Conditions:

I.B. Additional TRC Limitations and Monitoring Requirements

Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790, bacteria standards; other waters. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to

comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.

I.C.1. 95% Capacity Reopener

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 2 for all POTW and PVOTW permits.

I.C.2. CTO, CTC Requirement

Rationale: Required by Code of Virginia 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790.

I.C.3. Licensed Operator Requirement

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 D and the Code of Virginia § 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators.

This facility has a Class I operator requirement that is in accordance with the referenced regulation.

I.C.4. Indirect Dischargers

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 1 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

I.C.5. Sludge Use and Disposal

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B 2; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the Department of Health's Biosolids Use Regulations, 12 VAC 5-585-10 et seq.

I.C.6. Sludge Reopener

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-220 C 4 for all permits issued to treatment works treating domestic sewage.

I.C.7. Compliance Reporting Under Part I.A and Part I.B

Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to

assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

I.C.8. Operations and Maintenance (O&M) Manual Requirement

Rationale: Required by Code of Virginia 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190 E.

I.C.9. Water Quality Standards Monitoring

Rationale: State Water Control Law 62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

I.C.10. Toxics Management Program

Rationale: VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

I.C.11 TMDL Reopener

Rationale: Section 303(d) of the Clean Water Act requires that total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

I.C.12 Reliability Class

Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

I.D. Pretreatment Program

Rationale: VPDES Permit Regulation, 9 VAC 25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

I.E. Storm Water Management (Special Conditions I.E., I.F., and I.G.)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-10 defines discharges of storm water from municipal treatment plants with design flow of 1.0 MGD or more, or plants with approved pretreatment programs, as discharges of storm water associated with industrial activity. 9 VAC 25-31-120 requires a permit for these discharges. The Pollution Prevention Plan requirements are derived from the VPDES general permit for discharges of storm water associated with industrial activity, 9 VAC 25-151-10 et seq.

21. Changes to the Permit:

The boilerplate language used throughout the permit has been updated to reflect the current VPDES Permit Manual.

Special Conditions - Deletions of Conditions from the Current Permit
Part I.C.8 – Bypasses has been removed from the permit. The current VPDES Permit Manual states "Bypasses of treatment units at the treatment facility are allowable provided they are in compliance with the bypass language that is included in the boilerplate of each permit (Part II.U). There is no need to list in the permit the potential points where bypasses may occur or to include any further special language addressing bypasses at the facility. Bypasses must be reported in accordance with Part II.U. If the permit limits are met there is no requirement to report a bypass."

Special Conditions - Changes to Conditions in the Current Permit
Part I.C.2 - CTC, CTO, and O&M Manual Requirement has been split into two special conditions to reflect the current VPDES Permit Manual. The new CTC, CTO Requirements special condition replaces Part I.C.2. The new O&M Manual Requirement special condition replaces **Part I.C.8** (see Special Conditions – Deletions of Conditions from the Current Permit).

Permit Limits and Monitoring Requirements – Additions
E. coli - A new monthly average E. coli limit of 126 N/100ml, calculated as a geometric mean, is added. Monitoring using grab samples will be performed twice per month in order to calculate the geometric mean.

Permit Limits and Monitoring Requirements – Changes
BOD_5 – The monitoring frequency for BOD_5 is reduced from once per day to five times per week.

22. Variances/Alternate Limits or Conditions:

No variances or alternate limits are included in this permit.

23. Regulation of Users: 9 VAC 25-31-280 B 9

The treatment works is owned by the municipality. Regulation of industrial users contributing to the treatment works is provided by the approved Pre-Treatment program.

24. Public Notice Information required by 9 VAC 25-31-280 B:

All pertinent information is on file and may be inspected, and copied by contacting [**Permit Writer** at:

Virginia DEQ Blue Ridge Regional Office – Roanoke
3019 Peters Creek Road
Roanoke, Virginia 24019
Telephone No. (540)562-6700
kaharlow@deq.virginia.gov

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

25. Additional Comments:

Previous Board Action:

Staff Comments:

Public Comments:

26. 303(d) Listed Segments (TMDL):
This facility discharges directly to the Smith River. The stream segment receiving the effluent is listed for non attainment of bacteria and the General Standard (benthic) in part I of the current approved 303(d) list. EPA approved the Bacteria TMDL Development for the Dan river, Blackberry Creek, Byrds Creek, Leatherwood Creek, Marrowbone Creek, North Fork Mayo river, South Fork Mayo River, Smith River, Sandy Creek, and Sandy River Watersheds on December 8, 2008. It contains an E. coli WLA for this discharge of 3.82E+10 cfu/day or 1.39E+13 cfu/year. This permit has a limit of 126N/100mL for E. coli that is in compliance with the TMDL. The benthic TMDL study has not been completed.

Table I

NUMBER AND DESCRIPTION OF OUTFALLS

Outfall	Source of Discharge (List Operations Contributing Flow)	Treatment (Brief Description Unit by Unit)	Average/Maximum Flow (Give Avg/Max for Industry; Design for Municipal)
001	residential, commercial, and industrial sources	extended aeration see detailed description in Section 10	8.0 MGD design flow
002	stormwater	none	variable by storm event
003	stormwater	none	variable by storm event

TABLE II

EFFLUENT LIMITATIONS FOR MARTINSVILLE STP
OUTFALL 001

( ) Interim Limitations
(X) Final Limitations

From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS		EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	Effluent Guidelines /Judgement	Water Quality	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow, (MGD)	NA		NL	NA	NA	NL	Continuous	Totalizing, Indicating & Recording
pH, (standard units)	1	3	NA	NA	6.0	9.0	1/Day	Grab
BOD5,(biochemical oxygen demand) mg/l	1	4	22.5 mg/l 681 kg/d	33.8 mg/l 1022 kg/d	NA	NA	5/Week	24 HC
Total Suspended Solids	1		30 mg/l 908 kg/d	45 mg/l 1363 kg/d	NA	NA	1/Day	24 HC
Dissolved Oxygen		4	NA	NA	6.0 mg/l	NA	1/Day	Grab
Total Residual Chlorine (TRC), final effluent limit		3	14 µg/l	17 µg/l	NA	NA	1/Day	Grab
E. coli		3,6	126N/100mL	NA	NA	NA	2/Month	Grab

NA = Not Applicable
NL = No Limitations

The basis for the limitations codes are:

1. Federal Effluent Guidelines
2. Best Engineering Judgement, Public Water Supply to protect NC intakes
3. Water Quality Standards
4. Other - WQMP
5. Best Professional Judgement
6. Dan River Bacteria TMDL

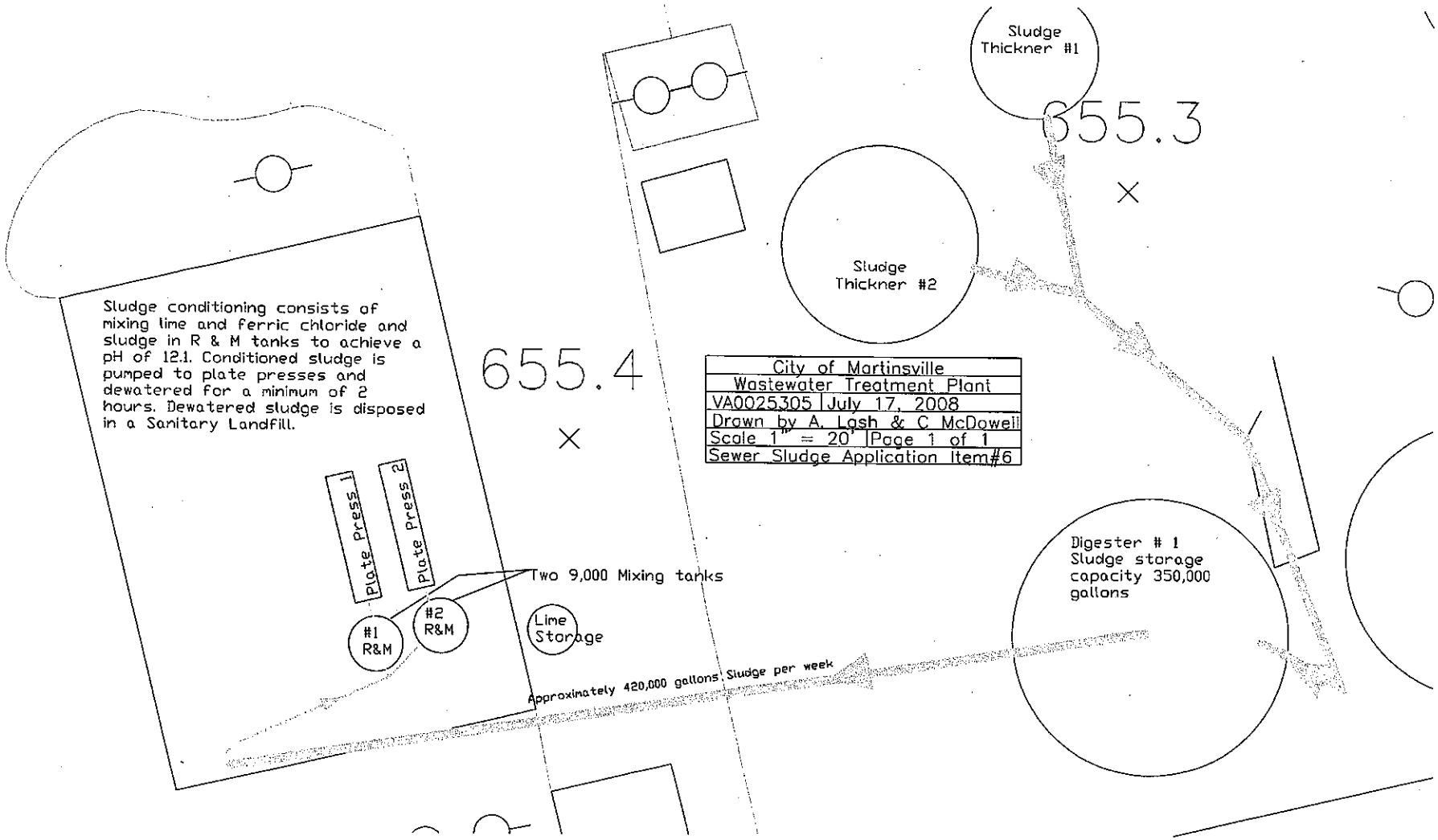
Note: 1. See Part I.B. for additional Total Residual Chlorine requirements including 1/2HR sampling at the end of the chlorine contact tank.

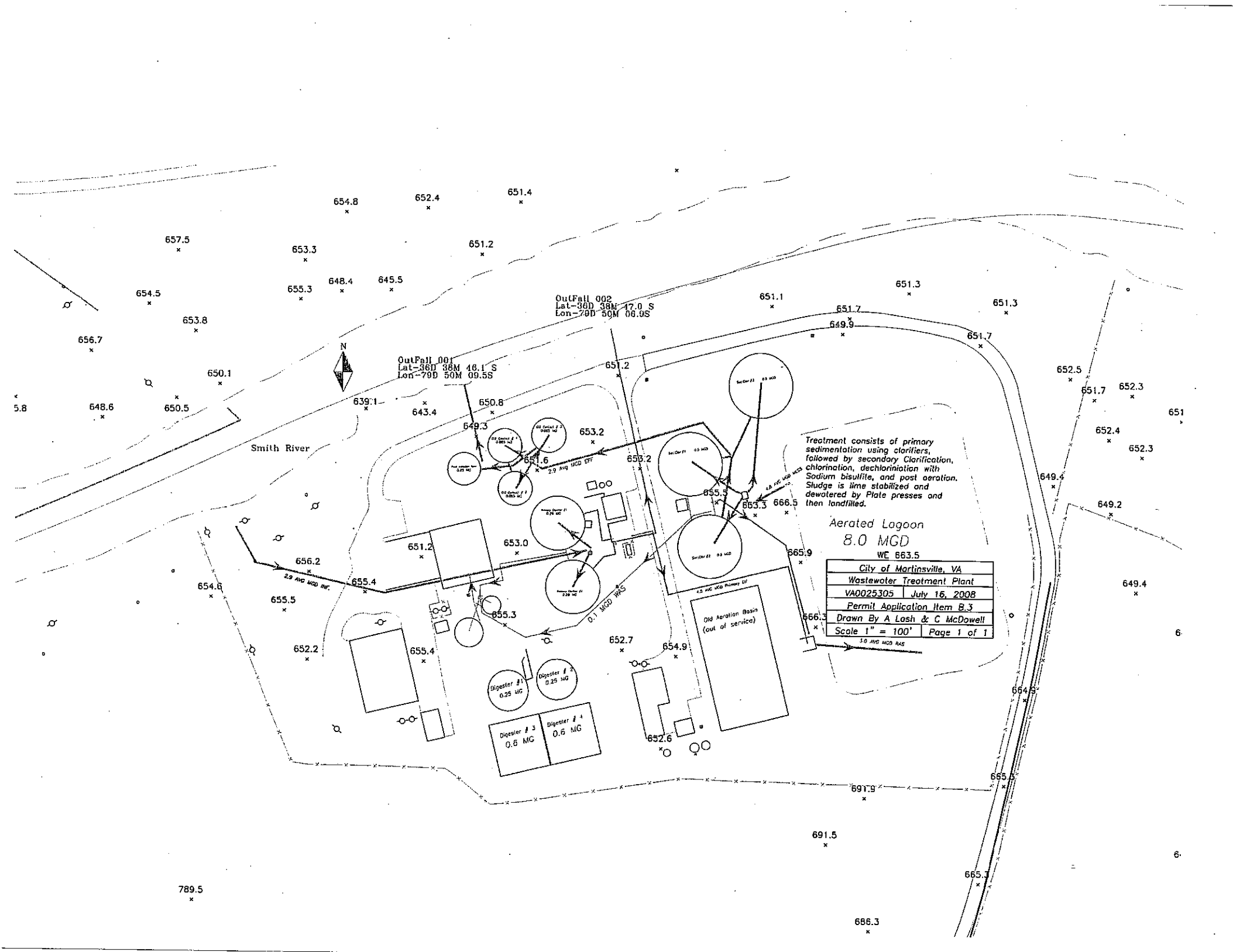
Attachments

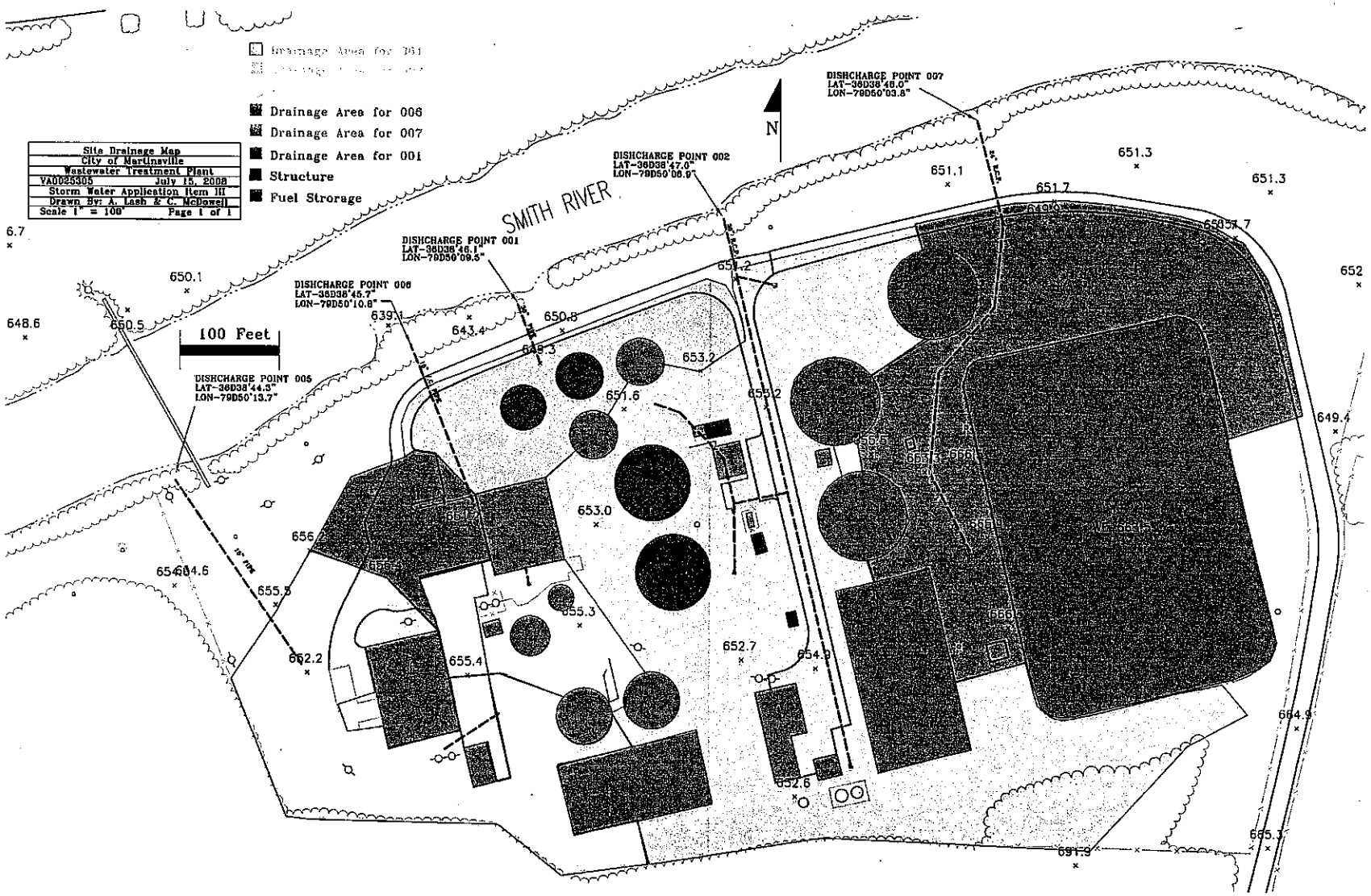
A. Wastewater Treatment Diagrams
B. USGS Topographic Map
C. Flow Frequency Memorandum
D. Site Visit Report
E. Ambient Water Quality Information
   - 2006 Impaired Waters Report (Excerpt)
   - Dan River TMDL Report (Excerpt)
   - STORET Data (Station 4ASRE022.71)
F. Wasteload and Limit Calculations
   - Mixing Zone Calculations (MIXER)
   - Daily Effluent pH Data
   - BOD5 DMR Data
   - Wasteload Allocation Spreadsheet
   - STATS Program Results
G. Historical Limit Development
H. TMP Justification Memorandum

Attachment A

Wastewater Treatment Diagrams


Sludge Thickner #1
655.3
Sludge Thickner #2
655.4
Sludge conditioning consists of mixing lime and ferric chloride and sludge in R & M tanks to achieve a pH of 12.1. Conditioned sludge is pumped to plate presses and dewatered for a minimum of 2 hours. Dewatered sludge is disposed in a Sanitary Landfill.
Plate Press 1
Plate Press 2
Two 9,000 Mixing tanks
#1 R&M
#2 R&M
Lime Storage
Approximately 420,000 gallons Sludge per week
Digester # 1 Sludge storage capacity 350,000 gallons
City of Martinsville
Wastewater Treatment Plant
VA0025305 | July 17, 2008
Drawn by A. Lash & C McDowell
Scale 1" = 20' | Page 1 of 1
Sewer Sludge Application Item#6


OutFall 002
Lat-36D 38M 47.0 S
Lon-79D 50M 06.9S
OutFall 001
Lat-36D 38M 46.1 S
Lon-79D 50M 09.5S
N
Smith River
Treatment consists of primary sedimentation using clarifiers, followed by secondary Clarification, chlorination, dechloriniation with Sodium bisulfite, and post aeration. Sludge is lime stabilized and dewotered by Plate presses and then landfilled.
Aerated Lagoon
8.0 MGD
WE 663.5
City of Martinsville, VA
Wastewater Treatment Plant
VA0025305 | July 16, 2008
Permit Application Item B.3
Drawn By A Lash & C McDowell
Scale 1" = 100' | Page 1 of 1
2.9 AVG MGD INF.
2.9 Avg MGD EFF
4.8 AVG MGD MCS
4.8 AVG MGD Primary Eff
0.1 MGD WAS
5.0 AVG MGD RAS
Old Aeration Basin (out of service)
Digester #1 0.25 MG
Digester #2 0.25 MG
Digester #3 0.6 MG
Digester #4 0.6 MG


Drainage Area for 006
Drainage Area for 007
Drainage Area for 001
Structure
Fuel Strorage
Site Drainage Map
City of Martinsville
Wastewater Treatment Plant
VA0025305 July 15, 2008
Storm Water Application Item III
Drawn By: A. Lash & C. McDowell
Scale 1" = 100' Page 1 of 1
SMITH RIVER
N
100 Feet
DISCHARGE POINT 001
LAT-36D36'46.1"
LON-79D50'09.5"
DISCHARGE POINT 002
LAT-36D36'47.0"
LON-79D50'08.9"
DISCHARGE POINT 005
LAT-36D36'44.5"
LON-79D50'13.7"
DISCHARGE POINT 006
LAT-36D36'45.7"
LON-79D50'10.8"
DISCHARGE POINT 007
LAT-36D36'48.0"
LON-79D50'03.8"
650.1
650.5
648.6
6.7
639.1
643.4
649.3
650.8
651.2
651.1
651.3
651.7
652
649.4
653.2
651.6
653.0
656
655.5
654.6
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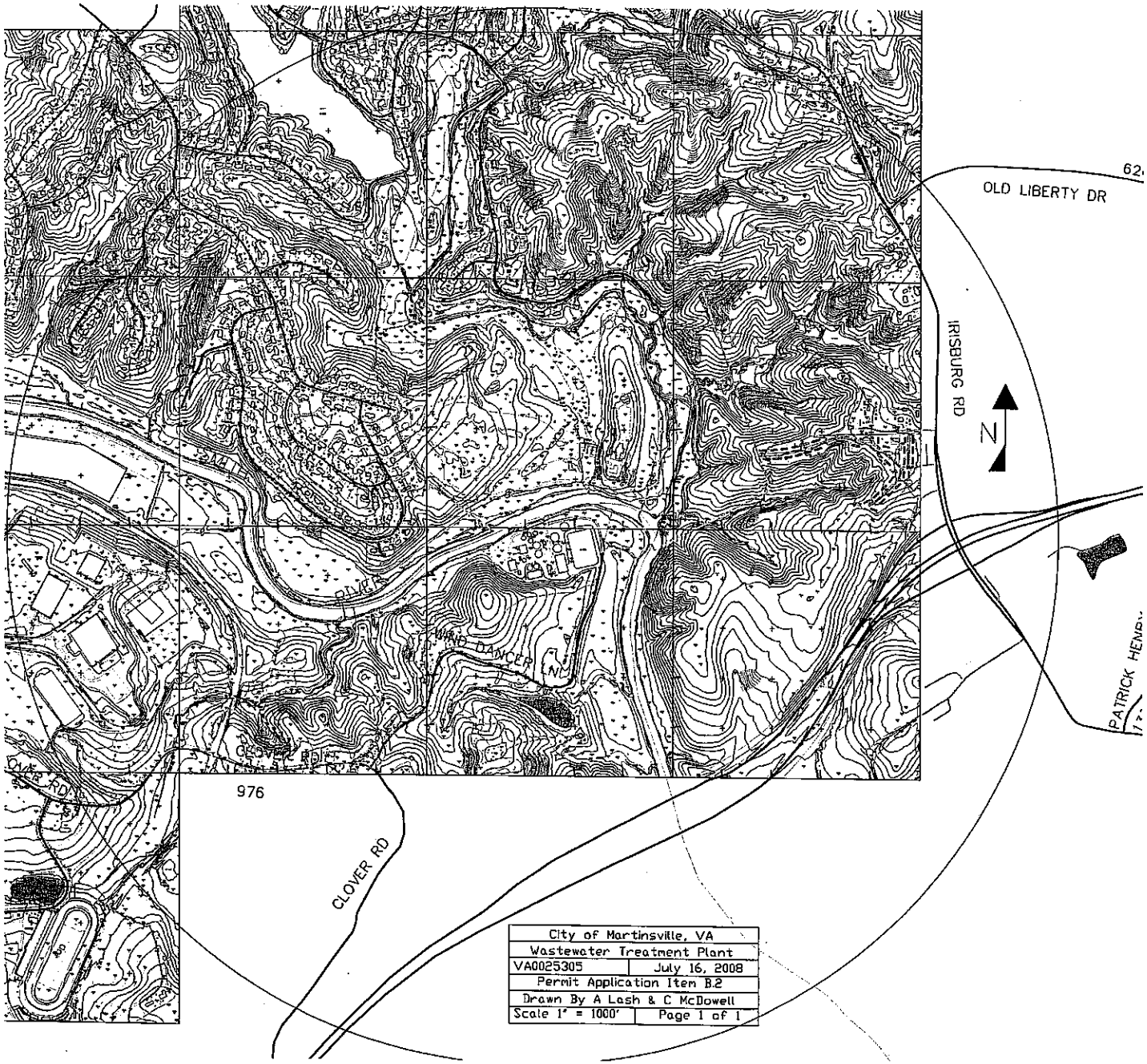
665.3
691.9

Attachment B

USGS Topographic Maps



City of Martinsville, VA	
Wastewater Treatment Plant	
VA0025305	July 16, 2008
Permit Application Item B.2	
Drawn By A Lash & C McDowell	
Scale 1" = 1000'	Page 1 of 1

Attachment C

Flow Frequency Memorandum

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

WEST CENTRAL REGIONAL OFFICE

3019 Peters Creek Rd. Roanoke, VA 24019

SUBJECT: Flow Frequency Determination
Martinsville STP - #VA0025305

TO: Permit File

FROM: Kevin Harlow

DATE: December 30, 2008

COPIES: Kevin Harlow

The Martinsville STP discharges to the Smith River near Martinsville, VA. Flow frequencies are required at these sites for use in developing effluent limitations for the VPDES permits.

The USGS and VDEQ have operated continuous record gages on the Smith River; one near Philpott, VA (#02072000), one near Bassett, VA (#02072500), and one at Martinsville, VA (#02073000) (VDEQ gage). The gages are in close proximity to the discharge points. The three gages were used in accordance with the procedure outlined in Charles Martin's memo of 2/17/93 to Mike McLeod, Subject: "Low Flow Frequencies for Main Stem Smith River for Calculating TMDL's". In a nutshell, Charles used the regulated record from the Philpott gage for main stem regulated flows below the Philpott Dam; he used the unregulated record from the Bassett gage to estimate flows contributed by the unregulated drainage area between Philpott Dam and Martinsville Dam and below Martinsville Dam to he North Carolina line; and he used the regulated record from the Martinsville gage for main stem regulated flows below the Martinsville Dam. This updated analysis incorporates additional years of regulated data collected at the gages since the earlier analysis.

The flow frequencies for the gages and the discharge points are presented below. The values at each discharge point were determined as described below and do not address any withdrawals, discharges, or springs lying upstream.

Smith River near Philpott, VA (#02072000):

Drainage Area = 216 mi^2

1Q10 = 19 MGD	High Flow 1Q10 = 22 MGD	30Q10 = 46 MGD
7Q10 = 39 MGD	High Flow 7Q10 = 51 MGD	HF30Q10 = 58 MGD
30Q5 = 54 MGD	HM = 74 MGD	

Smith River at Bassett, VA (#02072500):

Drainage Area = 259 mi^2

1Q10 = 32 MGD	High Flow 1Q10 = 37 not contiguous	30Q10 = 65 MGD
7Q10 = 57 MGD	High Flow 7Q10 = 69 not contiguous	HF30Q10 = 75 MGD
30Q5 = 74 MGD	HM = 110 MGD	

Smith River at Martinsville, VA (#02073000):

Drainage Area = 380 mi^2

1Q10 = 23 MGD	High Flow 1Q10 = 35 MGD	30Q10 = 103 MGD
7Q10 = 87 MGD	High Flow 7Q10 = 105 MGD	HF30Q10 = 120 MGD
30Q5 = 118 MGD	HM = 187 MGD	

Smith River at Martinsville STP discharge point:
Flow frequencies are determined by adding flow contributed by intervening drainage area to flows from the Martinsville Dam using the Martinsville gage.

Drainage Area = 390 mi^2
Intervening drainage area = 390 - 380 = 10 mi^2

1Q10 = 23 MGD + [(32-19)/43 * 10)] = 25 MGD
7Q10 = 87 MGD + [(57-39)/43 * 10)] = 90 MGD
30Q10 = 103 MGD + [(65-46)/43 * 10)]= 107 MGD
30Q5 = 118 MGD + [(74-54)/43 * 10)] = 122 MGD
High Flow 1Q10 = 35 MGD + [(37-22)/43 * 10)] = 38 MGD
High Flow 7Q10 = 105 MGD + [(69-51)/43 * 10)] = 108 MGD
High Flow 30Q10 = 120 MGD + [(75-58)/43 * 10)] = 124 MGD
HM = 187 MGD + [(110-74)/43 * 10)] = 194 MGD

The high flow months are January through June.

Attachment D

Site Visit Report

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office
3019 Peters Creek Road, Roanoke, Virginia 24019
Telephone (540) 562-6700, Fax (540) 562-6725
www.deq.virginia.gov

L. Preston Bryant, Jr
Secretary of Natural Resources

David K. Paylor
Director

Steven A. Dietrich
Regional Director

March 12, 2007

Mr. John H. Dyches
Water Resources Manager
City of Martinsville
55 West Church Street
Martinsville, VA 24114

Re: Technical and Laboratory Inspection Reports
Martinsville Water Pollution Control Plant
VPDES Permit No. VA0025305

Dear Mr. Dyches:

Attached for your review are copies of the technical and laboratory inspection reports for the Martinsville Water Pollution Control Plant. I conducted the inspection on February 08, 2007.

Please note that page 5 of the technical report summarizes a recommendation for action related to the wastewater treatment system. We request that you respond to this office **within 15 days** on this recommendation and provide details of actions taken and/or proposed to correct the deficiency. All proposed actions must also include a schedule for completion.

With regard to the laboratory inspection, deficiencies were noted in the Laboratory Records and BOD_5 parameter sections. The deficiencies are discussed in detail on the first two pages of the laboratory report. In view of the significance attached to proper sampling and analysis of samples for use in complying with the terms of the facility's permit, please review the attached report and make the required corrections. **Within 15 days** you are required to submit a letter with supporting documentation that corrective actions have been taken.

Also, I would like to inform you of the new electronic option now available for submission of your facility's Discharge Monitoring Report (DMR) data. The Department of Environmental Quality (DEQ) now offers electronic DMR (e-DMR) submittal as an alternative to the current paper DMR submittal process. Using an electronic process for submitting effluent quality data can represent significant labor savings while increasing the timeliness, accuracy, and overall reliability of this information. The e-DMR software utilizes a universal file format to provide quick and easy transmission of data, and provides three methods for online data reporting. For more information on the e-DMR reporting system, including the participation package download, answers to frequently asked questions, and link to the e-DMR demonstration site, please visit the following website;
http://www.deq.virginia.gov/water/edmrfaq.html.

If you have any questions regarding this report or the actions required, please contact me at the West Central Regional Office, Roanoke (540-562-6722).

Sincerely,

Ryan L. Hendrix
Compliance Inspector Senior

Attachments

Copies: S. C. Hale, R. L. Hendrix, File - DEQ/WCRO
S. G. Stell - DEQ/OWCP
Carman McDowell – City of Martinsville

s identified at last inspection:	Corrected	Not Corrected
1. **Repair the overhead lights in the chlorine bulk storage room and return to service.**	[X]	[ ]

SUMMARY

Recommendations for action:

1. **Keep this office apprised of the completion of work required to repair the damaged effluent pipe located at outfall 001.**

Comments:

There are no additional comments.

DEPARTMENT OF E[illegible]ONMENTAL QUALITY – WEST CENTR[illegible] REGIONAL OFFICE
[illegible]ORATORY INSPECTION REPORT SUM[illegible]
10/01

FACILITY NAME:	Martinsville Water Pollution Control Plant	VPDES NO:	VA0025305	INSP. DATE:	02/08/2007

LABORATORY RATING		
		NO DEFICIENCIES
	X	DEFICIENCIES

QUALITY ASSURANCE/QUALITY CONTROL

No deficiencies were noted with the Quality Assurance/Quality Control section.

LABORATORY RECORDS

Deficiencies were noted with the Laboratory Records section. The following items must be corrected:

- **The effluent time of analysis is not being recorded for the pH parameter. Analysis time must be recorded separately on the facility's bench sheet to document proper holding times are being met. Please make the necessary modifications to your effluent pH log and submit for approval.**
- **Upon review of the solids drying oven temperature log, several occurrences of the oven temperature falling below the 103°C minimum exist. There is no documentation showing adjustments were made and/or that the temperature recovered to the appropriate range (104 ± 1°C). As a result the Total Suspended Solids (TSS) data should have been flagged on both the bench sheets and the December 2006 discharge monitoring report (DMR). Please submit a revised DMR for December 2006.**
- **While the facility made note of "flagged" Biochemical Oxygen Demand data on the DMR, an asterisk (*) must be placed within the corresponding parameter boxes to direct the reader's attention to the comments section. In addition, the data must be also be flagged on the original bench sheet to clearly identify which values are being flagged and for what reason.**

Notes(s): There were numerous incidents where data was over-written and/or scribbled through. This is not appropriate. The proper procedure for making corrections to bench sheets is to strike-through the incorrect data with a single line, write the date, initials of the analyst making the correction and the corrected data nearby.

GENERAL SAMPLING AND ANALYSIS

No deficiencies were noted with the General Sampling and Analysis section.

LABORATORY EQUIPMENT

No deficiencies were noted with the Laboratory Equipment section.

Note(s): All thermometers need to be verified within the correct operating range called for by the individual method of analysis. The solids oven thermometer was verified using water and the technician stated she had a hard time getting the temperature up to 103 – 105°C. Please remember it is perfectly acceptable to verify the drying oven thermometer against an NIST traceable reference thermometer in the drying oven itself.

PARAMETER SUMMARY

pH

No deficiencies were noted for the analysis of the pH parameter.

PARAMETER SUMMARY (Cont.)

Total Residual Chlorine (TRC) - Amperometric Direct Titration

No deficiencies were noted for the analysis of the TRC parameter.

Total Suspended Solids (TSS)

No deficiencies were noted for the analysis of the TSS parameter.

Dissolved Oxygen (D.O.) - Field

No deficiencies were noted for the analysis of the D.O. parameter.

Dissolved Oxygen (D.O.) - BOD_5

No deficiencies were noted for the analysis of the D.O. parameter.

Five-Day Biochemical Oxygen Demand (BOD_5)

Deficiencies were noted for the analysis of the BOD_5 parameter. The following item must be corrected:

- The toxicity evaluation is being miscalculated. The facility staff is using the calculated BOD_5 as the numerator in the equation. The correct calculation for demand per mL of sample is to divide the seed corrected, delta (Δ) D.O. by the volume of sample used in the dilution. (See attached documentation)

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

L. Preston Bryant, Jr
Secretary of Natural Resources

West Central Regional Office
3019 Peters Creek Road, Roanoke, Virginia 24019
Telephone (540) 562-6700, Fax (540) 562-6725
www.deq.virginia.gov

David K. Paylor
Director

Steven A. Dietrich
Regional Director

March 12, 2007

Mr. John H. Dyches
Water Resources Manager
City of Martinsville
55 West Church Street
Martinsville, VA 24114

Re: Stormwater Inspection Report
Martinsville Water Pollution Control Plant
VPDES Permit No. VA0025305

Dear Mr. Dyches:

Attached for your review is a copy of the stormwater inspection report for the Martinsville Water Pollution Control Plant. I conducted the inspection on February 08, 2007.

Please note the report documents deficiencies noted during the inspection. We request you respond to this office **within 15 days** and provide details of actions taken and/or proposed to correct the noted deficiencies. All proposed actions must also include a schedule for completion.

If you have any questions regarding this report or the actions required, please contact me at the West Central Regional Office, Roanoke (540-562-6722).

Sincerely,

Ryan L. Hendrix
Compliance Inspector Senior

Attachments

Copies: S. C. Hale, R. L. Hendrix, File - DEQ/WCRO
S. G. Stell - DEQ/OWCP
Carman McDowell – City of Martinsville

OUTFALL OBSERVATIONS

Outfall #	Condition of Effluent	Condition of Receiving Stream	Samples Collected (Y or N)
001	Clear	The Smith River was slightly turbid.	N
002	No Discharge	The Smith River was slightly turbid.	N
003	No Discharge	The swale to the Smith River appeared clear.	N
006	No Discharge	The swale to the Smith River appeared clear.	N
007	No Discharge	The swale to the Smith River appeared clear.	N

OUTFALL DISCUSSION:

All outfalls appeared to be accessible and in operable condition.

DESCRIPTION AND EFFECTIVENESS OF BMPs/CONTROLS USED ON SITE:

Best Management Practices (BMPs) and controls at this location are excellent. All outdoor storage areas are covered and in good condition. Housekeeping in and around the facility was also excellent. There was no evidence of recent spills or leaks.

COMMENTS/RECOMMENDATIONS:

1. **Conduct and document periodic employee training as required by the facility's VPDES permit (Part 1, Section G.2.b) at least once per year.**

Attachment E

Ambient Water Quality Information

- STORET Data (Station 4ASRE022.71)
- Dan River TMDL Report (Excerpt)
- 2006 Impaired Waters Report (Excerpt)

Martinsville STP VA0025305
Stream Data on Smith River at
Mon. Station 4ASRE022.71

Date	Temp Celsius	Field pH	Hardness
06/12/01	23.1	8.2	13.4
05/15/01	17.5	7.6	22.4
04/09/01	18.3	8.2	20.9
03/08/01	6.4	8	18.3
02/08/01	7.3	7.9	30.1
01/09/01	4.1	7.5	22.2
12/07/00	4.9	7.2	23.7
11/13/00	10.2	8.8	23.7
10/19/00	15.3	8.7	25.2
08/07/00	23.5	7.8	25.1
07/20/00	21.8	7.5	24
06/21/00	21.7	6.75	24
05/23/00	17.9	6.66	29
04/05/00	12	7.01	24
03/22/00	10	6.86	22
02/23/00	6.8	6.7	28
01/12/00	6.8	6.45	29.1
12/08/99	7.6	7.07	29.6
11/03/99	12.6	6.51	
10/21/99	13.1	7.66	26.2
09/27/99	19.8	7.6	61.2
08/26/99	15	7.73	24.4
07/27/99	23.3	7.48	26.7
06/16/99	16.7	7.8	25.2
05/19/99	17.2	8.3	26
04/19/99	12.3	7.63	26
03/29/99	10.8	7.89	26
02/11/99	7.9	7.2	48
01/21/99	6.1	7.63	26
12/09/98	13.7	7.43	28
11/23/98	9.9	8.07	28.7
10/29/98	14.2	7.29	22
09/03/98	19.5	7.63	24.4
08/10/98	22.7	7.12	24.4
07/27/98	20.9	7.24	27.1
06/24/98	17.4	8.19	23.5
05/06/98	11.4	7.23	24.5
04/13/98	13.9	7.77	24.3
03/17/98	7.1	7.14	21.6
02/19/98	7	6.9	22.4

Martinsville STP VA0025305
Stream Data on Smith River at
Mon. Station 4ASRE022.71

01/20/98	6.5	7.26	21.8
12/11/97	7	7.18	25.6
11/19/97	7.4	7.58	25.5
10/28/97	12.6	7.98	22.8
09/30/97	18.1	7.67	16
08/21/97	18.1	7.17	23.7
07/31/97	17.2	7.75	24.1
06/25/97			24.9
05/14/97	13.4	7.67	22.6
04/28/97	10.6	7.46	22.7
03/10/97	9.8	7.75	21.8
02/19/97	6.6	7.75	19.7
01/27/97	4.9	7.62	24.9
12/17/96	8.2	7.24	24
11/07/96	15.5	7.3	23
10/21/96	14.1	7.46	30
09/23/96	20.4	7.83	30
08/21/96	18.7	7.53	20
07/24/96	22.8	7.9	22
06/13/96	11.5	8.1	12
05/16/96	12.4	7.7	26
04/17/96	10.8	6.7	19
03/25/96	12	7.2	32
02/26/96	13	7.68	25
01/24/96	6	6.77	21
12/18/95	7.4	6.89	27
11/28/95	9.4	7.02	31
10/30/95	13.1	7.13	28
09/27/95	15.5	7.4	24
08/28/95	19	7.47	26
07/31/95	23.9	7.72	24
06/20/95	20.5	7.1	22
05/17/95	16.2	6.93	20
04/18/95	16.2	7.44	25
03/28/95	14.5	7.66	22
02/23/95	6.9	7.83	20
01/25/95	6.9	7.48	17
12/08/94	11.8	7.8	18
11/15/94	11	7.37	20
10/19/94	13.8	7.25	22
09/12/94	19.8	7.76	25
08/24/94	14	7.64	19

Martinsville STP VA0025305
Stream Data on Smith River at
Mon. Station 4ASRE022.71

07/28/94	20.1	6.89	26
06/27/94	21.2	6.94	22
05/31/94	19.8	7.6	24
04/28/94	12.8	7.7	21
03/23/94	13.2	8	18
02/24/94	6.8	7.6	18
01/24/94	4.6	7.6	28
12/15/93	5.9	7.2	30
10/27/93	14.9	7.1	34
09/20/93	20.6	7.1	26
08/25/93	22.7	7.2	20
07/28/93	21.6	7.8	24
06/28/93	23	7.7	22
05/20/93	12.6	7.2	18
04/27/93	10.5	7.4	20
03/30/93	8.2	7.5	18
02/10/93	6.8	8	24
01/26/93	5	7.7	20
12/22/92	7.8	6.8	23
11/16/92	9.4	6.9	26
11/09/92	7.5	7.6	30
10/26/92	13.7	7.7	34
09/24/92	17.5	7.7	28
08/25/92	18.9	7.8	24
08/24/92			
07/16/92	20.4	6.8	24
06/16/92	17.1	7.2	
05/19/92	12.3	7.4	
04/20/92	21.6	7.8	28
03/16/92	5.4	7.4	24
02/12/92	6.6	7.8	24
12/11/91	11.5	7.7	24
10/21/91	13.2	7.8	24
09/16/91			34
09/13/91	22.7	7.7	
08/21/91	21.3	8.4	20
07/15/91			
06/12/91	19.8	8.8	12
05/28/91	19.4	7	20
04/16/91	11.9	7.9	12
04/11/91	12.4	6.6	46
02/21/91	9.5	7.3	22

Bacteria TMDL Development for the Dan River, Blackberry Creek, Byrds Branch, Double Creek, Fall Creek, Leatherwood Creek, Marrowbone Creek, North Fork Mayo River, South Fork Mayo River, Smith River, Sandy Creek, and Sandy River Watersheds

Submitted by

Virginia Department of Environmental Qualit

5.14 Smith River (VAW-L54R-01) TMDL

5.14.1 Smith River Wasteload Allocation

There are 2 facilities in the Smith River watershed permitted to discharge bacteria (see Chapter 4). For this TMDL, the wasteload allocation for permitted facilities is to maintain discharge at the design flow limits and bacteria concentrations at their permitted levels of 126 cfu/100mL. **Table 5-31** shows the loading from the permitted point source dischargers in the watershed. To account for future growth, the WLA was developed using 5 times the original allocation.

Table 5-31: Smith River (VAW-L54R-01) Wasteload Allocation for *E. coli*

Point Source	Existing Load (cfu/day)	Allocated Load (cfu/day)	Allocated Load (cfu/year)	Percent Reduction
VA0025305	3.82E+10	3.82E+10	1.39E+13	0%
VA0069345	1.91E+10	1.91E+10	6.97E+12	0%
Total	**5.73E+10**	**5.73E+10**	**2.09E+13**	**0%**
Total (Future Growth)			**1.05E+14**	**-**

5.14.2 Smith River (VAW-L54R-01) Load Allocation

The scenarios considered for Smith River (Reach 36) load allocation are presented in **Table 5-32.** The following conclusions can be made:

1. In Scenario 0 (existing conditions), the water quality standard was violated more than forty percent of the time in the Smith River.
2. In Scenario 3, elimination of the human sources (failed septic systems and straight pipes) and the livestock direct instream loading resulted in a 43 percent violation of this standard in the Smith River and a 48 percent violation of the *E. coli* instantaneous standard.
3. In Scenario 4, eliminating all sources except direct instream loading from wildlife resulted in no violations of either the *E. coli* geometric mean standard or the instantaneous *E. coli* standard.
4. No violations of either the *E. coli* geometric mean standard or the instantaneous *E. coli* standard occurred in the Smith River under Scenario 11.

2006 Impaired Waters

Categories 4 and 5 by DCR Watershed

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Roanoke and Yadkin River Basins

Fact Sheet prepared for DCR Watershed: L54R.*

Cause Group ID: **L54R-01-BEN** **Smith River**

2006 TMDL Group Codes: 00375

Location: The benthic impairment begins at the Martinsville Dam (Martinsville West Quad) and extends downstream to the mouth of Turkeypen Creek on the Northwest Eden Quad.

City / County: Henry Co Martinsville City

Use(s): Aquatic Life

Cause(s) / VA Category: Benthic-Macroinvertebrate Bioassessments (Streams) / 5A

Industrial plant closings in the Martinsville / Henry County area have resulted in the closurer of the Upper Smith River Henry County PSA wastewater treatment facility. Wastewater will be transported to the Martinsville STP. Greatly reduced influent chloride levels from industrial inputs to the Martinsville STP are anticipated with subsequent reductions of chlorides in the effluent. A 1998 Corbicula study indicates chlorides may have impacted the benthos. Chlorides have been greatly reduced as a result of plant closings in the area since the 1998 study. Improved benthic conditions are anticipated as a result.

Stations 4ASRE026.04 and 4ASRE015.43 below find improved conditions to the benthic community from Rapid Bioassessment Protocol II (RBP II) methods. However the entire 1998 303(d) Listing remains as data are insufficient for a partial length de-listing as described below.

4ASRE026.04 (below Martinsville Dam formerly coded 4ASRE026.38) Bio 'MI'; moderate impairment. Four RBP II surveys 2000 (spring score 60.87; fall- 52.38), 2003 (fall- 95.65) and 2004 (spring- 86.96). Numerous plant closings have taken place in the area including the Upper Smith River WWTP. Improved conditions at this and other downstream sites is anticipated as a result of the closings. However a decline in reference site conditions (4ASRE033.19- Rt. 701 Bridge - Fieldale) in VAW-L53R may also contribute to these higher scores. The Martinsville Dam affects the river by periodically causing some of the stream substrate to become dewatered, thus reducing the amount of habitat available for benthic macroinvertebrate production. The Dam also affects water quality by releasing water higher in temperature and lower in oxygen than the river would be without the impoundment.

4ASRE022.30 (below the Martinsville STP) Bio 'MI'; moderate impairment. Five RBP II surveys 2000 (spring- 43.48; fall- 66.67) , 2001 (fall- 66.67), 2003 (fall- 61.90) and 2004 (spring- 82.61). Fall 2001 survey finds the loss of sensitive taxa relative to the control site 4ASRE033.19. The fall 2001 survey is dominated by the pollution tolerant midge larvae, Chironomidae (49%). Improved conditions at this and other downstream sites is anticipated as a result of plant closings including the Upper Smith River WWTP. However a decline in reference site conditions (4ASRE033.19) may also contribute to higher scores at this site.

4ASRE019.00 (above the Marrowbone Creek mouth) Bio 'MI'; moderate impairment. Three RBP II surveys score in 2001 (fall- 52.38); 2003 (fall- 88.96) and 2004 (spring- 56.52). find moderate impacts to the benthic community. Pollution intolerant taxa are much reduced relative to the control station (4ASRE033.19). The dominant family observed at this station has typically been the moderately tolerant caddisfly Hydropsychidae. In the fall 2001 survey, the numbers of sensitive insects in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) decreased and the number of pollution tolerant organisms increased relative to earlier surveys.

4ASRE015.43 (Rt. 636 Bridge) Bio 'NI'; no impairment. Four RBP II surveys score 2000 (fall-85.71); 2001 (fall- 95.24); 2003 (fall- 91.30); and 2004 (spring- 73.91) find no impacts to the benthic community. The single spring sample during the current assessment period is not enough information to compare to the three fall samples. However, historical data shows that the benthic community at this site typically consisted of more pollution tolerant taxa and individuals in the spring. Scores within the 2006 data window indicate this portion as a candidate for delisting the noticeable decline in reference condtions noted in VAW-L53R and historical conditions prevent a definitive a de-listing.

2006 Impaired Waters

Categories 4 and 5 by DCR Watershed

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Roanoke and Yadkin River Basins

Fact Sheet prepared for DCR Watershed: L54R.*

Assessment Unit / Water Name / Description	Cause Category	/ Name	Cycle First Listed	TMDL Schedule	Size
VAW-L54R_SRE03A00 / Smith River Middle 1 / Smith River mainstem from the Leatherwood Creek mouth downstream to the confluence of Turkeypen Creek.	5A	Benthic-Macroinvertebrate Bioassessments (Streams)	1998	2010	4.76
VAW-L54R_SRE03A02 / Smith River Middle 2 / Smith River mainstem from the Marrowbone Creek mouth downstream to the confluence of Leatherwood Creek.	5A	Benthic-Macroinvertebrate Bioassessments (Streams)	1998	2010	1.71
VAW-L54R_SRE04A00 / Smith River Middle 3 / The mainstem Smith River located between the HCPSA Lower Smith River STP and the confluence of Marrowbone Creek.	5A	Benthic-Macroinvertebrate Bioassessments (Streams)	1998	2010	0.39
VAW-L54R_SRE05A00 / Smith River Upper 1 / The mainstem Smith River located between the Martinsville City STP outfall downstream to the Henry County PSA Lower Smith STP outfall.	5A	Benthic-Macroinvertebrate Bioassessments (Streams)	1998	2010	3.32
VAW-L54R_SRE06A00 / Smith River Upper 2 / The mainstem Smith River located between the Martinsville Dam downstream to Martinsville City STP outfall.	5A	Benthic-Macroinvertebrate Bioassessments (Streams)	1998	2010	3.59

Smith River	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Benthic-Macroinvertebrate Bioassessments (Streams) - Total Impaired Size by Water Type:			13.77

Sources:

Dam or Impoundment	Municipal (Urbanized High Density Area)	Sediment Resuspension (Clean Sediment)	Silviculture Harvesting

*The narrative above describes the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

2006 Impaired Waters

Categories 4 and 5 by DCR Watershed

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Roanoke and Yadkin River Basins

Fact Sheet prepared for DCR Watershed: L54R.*

Cause Group ID: **L54R-01-BAC** **Smith River**

2006 TMDL Group Codes: 01713 50293

Location: The bacteria impairment begins at the Martinsville Dam (Martinsville West Quad) and extends downstream to the VA/NC State Line on the Northwest Eden Quad.

City / County: Henry Co Martinsville City

Use(s): Recreation

Cause(s) / VA Category: Fecal Coliform / 5A

Station 4ASRE022.71 is a 1999 Federal Consent Decree Attachment B station and was not 2002 listed as impaired. Only four of 59 samples exceeded the former 1000 cfu/100 ml instantaneous criterion for an exceedance rate of 6 percent in 2002. The 2002 303(d) Listing for 10.18 miles has been extended upstream 3.59 miles (2004 IR) and downstream 6.29 miles (2006 IR) for a total of 20.06 miles thru the 2006 Assessment. Future assessment and 303(d) Listings will replace fecal coliform bacteria with Escherichia coli (E.coli) bacteria as the indicator with sufficient E.coli data as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters].

4ASRE022.71 (Footbridge above the Martinsville STP) There are no additional data beyond the 2004 IR. The 2004 IR reports eight of 41 FC samples exceed the 400 cfu/100 ml instantaneous criterion. Exceeding values range from 500 to greater than 8000 cfu/100 ml. The 2004 IR 303(d) Listing extends the 2002 bacteria impairment 3.59 miles upstream from the original 303(d) Listing. Data within the 2006 data window find three of 17 samples in excess of the criterion with exceeding values ranging from 600 to 900 cfu/100 ml.

4ASRE021.58 (Rt. 58 Bypass Bridge, Henry Co.) No additional data beyond the 2004 IR. The 2004 IR reports six of 35 FC observations exceed the 400 dfu/100 ml instantaneous criterion. The exceeding values range from 600 to greater than 8000 cfu/100 ml. The 2006 data window produces three of 17 FC samples in excess of the criterion ranging from 1100 to greater than 8000 cfu/100 ml.

4ASRE015.43 (Rt. 636 Bridge) No additional data beyond the 2004 IR. 2004 IR findings are FC exceeds the 400 cfu/100 ml criterion in six of 35 samples. Exceeding values range from 500 to 1300 cfu/100 ml. One excursion of the instantaneous criterion is found from 17 observations within the 2006 data data window. The single exceedance is 1100 cfu/100 ml.

4ASRE007.90- Six of 48 FC samples exceed the 400 cfu/100 ml instantaneous criterion with exceedences ranging from 600 to 950 cfu/100 ml within the 2006 data window. The 2006 IR extends the bacteria impairment downstream 6.29 miles from the original 2002 303(d) Listing of 10.18 miles.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-L54R_SRE01A00 / Smith River Lower 1 / Smith River mainstem from the Home Creek mouth downstream to VA/NC State Line.	5A Fecal Coliform	2006	2014	3.22
VAW-L54R_SRE02A00 / Smith River Lower 2 / The mainstem Smith River located between the Turkey Pen Creek mouth downstream to the Home Creek mouth.	5A Fecal Coliform	2006	2014	3.07
VAW-L54R_SRE03A00 / Smith River Middle 1 / Smith River mainstem from the Leatherwood Creek mouth downstream to the confluence of Turkeypen Creek.	5A Fecal Coliform	2002	2014	4.76

2006 Impaired Waters

Categories 4 and 5 by DCR Watershed

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Roanoke and Yadkin River Basins

Fact Sheet prepared for DCR Watershed: L54R.*

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-L54R_SRE03A02 / Smith River Middle 2 / Smith River mainstem from the Marrowbone Creek mouth downstream to the confluence of Leatherwood Creek.	5A Fecal Coliform	2002	2014	1.71
VAW-L54R_SRE04A00 / Smith River Middle 3 / The mainstem Smith River located between the HCPSA Lower Smith River STP and the confluence of Marrowbone Creek.	5A Fecal Coliform	2002	2014	0.39
VAW-L54R_SRE05A00 / Smith River Upper 1 / The mainstem Smith River located between the Martinsville City STP outfall downstream to the Henry County PSA Lower Smith STP outfall.	5A Fecal Coliform	2002	2014	3.32
VAW-L54R_SRE06A00 / Smith River Upper 2 / The mainstem Smith River located between the Martinsville Dam downstream to Martinsville City STP outfall.	5A Fecal Coliform	2004	2014	3.59

Smith River	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fecal Coliform - Total Impaired Size by Water Type:			20.06

Sources:

- Livestock (Grazing or Feeding Operations)
- Municipal (Urbanized High Density Area)
- Unspecified Domestic Waste
- Wastes from Pets
- Wildlife Other than Waterfowl

*The narrative above describes the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

Attachment F

Wasteload and Limit Calculations

- **Mixing Zone Calculations (MIXER)**
- **Daily Effluent pH Data**
- **BOD5 DMR Data**
- **Wasteload Allocation Spreadsheet**
- **STATS Program Results**

Mixing Zone Predictions for Martinsville STP

Effluent Flow = 8.0 MGD
Stream 7Q10 = 90 MGD
Stream 30Q10 = 107 MGD
Stream 1Q10 = 25 MGD
Stream slope = .00208 ft/ft
Stream width = 100 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.7379 ft
Length = 5888.85 ft
Velocity = .8729 ft/sec
Residence Time = .0781 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.9156 ft
Length = 5417.39 ft
Velocity = .9293 ft/sec
Residence Time = .0675 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .8986 ft
Length = 10314.95 ft
Velocity = .5685 ft/sec
Residence Time = 5.0402 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 19.84% of the 1Q10 is used.

Virginia DEQ Mixing Zone Analysis Version 2.1

Martinsville Water Pollution Control Plant
VA0025305, Daily Effluent pH Data

Day	N	D	J	F	M	A	M	J	J	A	S	O
1	6.8	6.7	6.7	6.7	6.8	6.6	6.7	6.8	6.8	6.8	7.0	6.6
2	6.9	6.8	6.8	6.5	6.7	6.5	6.7	6.7	6.9	6.8	6.7	6.5
3	6.8	6.8	6.7	6.7	6.7	6.5	6.7	6.7	6.9	6.8	6.6	6.6
4	6.9	6.8	6.9	6.7	6.7	6.6	7.0	6.8	6.9	6.8	6.8	6.7
5	6.9	6.8	6.9	6.5	6.7	6.6	6.9	6.8	7.0	6.6	7.0	6.6
6	6.9	6.8	6.8	6.7	6.7	6.6	6.8	6.8	6.8	6.8	7.1	6.7
7	7.0	6.8	6.8	6.6	6.7	6.6	6.8	6.8	6.9	6.7	7.1	6.6
8	7.0	6.8	7.0	6.5	6.6	6.6	6.8	6.8	6.8	6.9	7.0	6.7
9	6.9	6.8	6.9	6.6	6.7	6.6	7.0	6.6	6.8	6.9	7.1	6.7
10	6.8	6.9	6.9	6.8	6.7	6.7	6.6	6.7	6.8	6.9	7.0	6.7
11	6.9	6.8	6.9	6.8	6.6	6.7	6.7	6.6	6.7	6.9	6.8	6.8
12	6.9	6.8	6.9	6.9	6.6	6.7	6.8	6.6	6.4	6.8	7.0	6.7
13	7.0	6.7	6.8	6.8	6.6	6.7	6.7	6.7	6.7	6.8	6.9	6.7
14	7.0	6.6	6.8	6.6	6.7	6.6	6.8	6.6	6.7	6.8	7.3	6.6
15	7.0	6.8	6.9	6.7	6.7	6.5	6.8	6.6	6.6	6.8	7.2	6.7
16	6.9	6.8	6.9	6.7	6.7	6.7	6.9	6.6	6.7	6.9	7.1	6.5
17	6.9	6.7	6.8	6.7	6.7	6.7	6.9	6.6	6.8	6.9	7.2	6.7
18	6.9	6.8	6.6	6.7	6.5	6.6	6.9	6.7	6.8	6.8	7.2	6.6
19	7.0	6.7	6.6	6.7	6.6	6.7	6.9	6.6	6.9	6.7	7.3	6.6
20	7.0	6.7	6.6	6.7	6.7	6.8	6.9	6.6	6.9	6.7	7.3	6.5
21	6.7	6.8	6.6	6.7	6.7	6.6	6.9	6.7	6.8	6.7	7.3	6.4
22	6.7	6.8	6.6	6.5	6.7	6.6	6.9	6.6	6.8	6.7	7.1	6.4
23	6.6	6.8	6.5	6.7	6.7	6.5	6.8	6.6	6.9	7.4	7.1	6.5
24	6.8	6.8	6.7	6.7	6.6	6.6	6.9	6.5	6.8	6.9	7.0	6.8
25	6.7	6.7	6.7	6.5	6.6	6.6	6.9	6.5	6.8	6.8	7.0	6.9
26	6.8	6.6	6.7	6.6	6.5	6.7	6.8	6.5	6.8	6.8	6.9	6.7
27	6.6	6.8	6.8	6.6	6.7	6.7	6.8	6.5	6.8	6.6	7.1	6.6
28	6.7	6.7	6.6	6.7	6.8	6.7	6.7	6.6	6.8	6.6	6.9	6.6
29	6.7	6.7	6.5	6.7	7.0	6.7	6.7	6.5	6.8	6.7	6.8	6.6
30	6.8	6.7	6.7	6.0	6.8	6.7	6.8	6.8	6.7	6.9	6.7	6.6
31	6.0	6.7	6.6	6.0	6.5	6.0	6.8		6.7	7.0		6.6

6.90 = 90th percentile pH, S.U.
6.60

Martinsville STP - VA0025305
BOD5 Monthly and Weekly Concentration DMR Data

Due Date	C_Mo	C_Wk
10-Oct-2008	12.9	15.4
10-Mar-2005	10.7	12.1
10-Feb-2006	8.3	14.5
10-Mar-2006	7.8	8.1
10-Feb-2005	7.3	8.9
10-Aug-2005	5.5	7.7
10-Dec-2005	5.3	14
10-Apr-2005	5.1	7
10-Mar-2007	4.7	8.7
10-Sep-2008	4.5	10.2
10-Feb-2008	4.5	8.6
10-Nov-2008	4.3	5.8
10-Nov-2007	4.2	10.9
10-Apr-2006	4.1	4.9
10-Feb-2007	3.5	8.5
10-Mar-2008	3.4	5.2
10-Jul-2005	3.1	3.7
10-Jan-2006	2.7	4.8
10-Apr-2007	2.7	2.6
10-Oct-2005	2.6	5.8
10-Sep-2005	2.3	5.1
10-Jul-2006	2.1	2.8
10-Jun-2006	2	7.5
10-May-2006	2	5
10-Dec-2004	1.9	5.7
10-Sep-2006	1.9	3.5
10-Dec-2006	1.7	4.3
10-Jun-2005	1.7	3.6
10-Jan-2007	1.5	3.3
10-Aug-2006	1.5	2.8
10-Oct-2006	1.4	4.4
10-Jul-2008	1.2	2.7
10-Jan-2008	1.2	1.8
10-Jan-2005	1.1	1.5
10-Oct-2007	1	2.5
10-Nov-2004	0.9	2.6
10-Aug-2008	0.9	2.4
10-Nov-2005	0.9	1.8
10-May-2005	0.9	1.5
10-Apr-2008	0.8	1.9
10-May-2008	0.6	1.7
10-Jun-2008	0.5	2
10-Dec-2008	0.5	1.6
10-Sep-2007	0.4	1.8
10-Dec-2007	0.4	1.7
10-May-2007	0.4	0.8
10-Jul-2007	0.2	1
10-Mar-2004	0	6.8
10-Feb-2004	0	0
10-Apr-2004	0	0
10-May-2004	0	0
10-Jun-2004	0	0
10-Jul-2004	0	0
10-Aug-2004	0	0
10-Sep-2004	0	0
10-Oct-2004	0	0
10-Nov-2006	0	0
10-Jun-2007	0	0
10-Aug-2007	0	0
Average	2.4	4.3
Maximum	12.9	15.4

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Martinsville STP Permit No.: VA0025305

Receiving Stream: Smith River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	100	mg/L
90% Temperature (Annual) =	21.6	deg C
90% Temperature (Wet season) =	20.2	deg C
90% Maximum pH =	8.1	SU
10% Maximum pH =	6.9	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	25	MGD
7Q10 (Annual) =	90	MGD
30Q10 (Annual) =	107	MGD
1Q10 (Wet season) =	38	MGD
30Q10 (Wet season)	124	MGD
30Q5 =	122	MGD
Harmonic Mean =	194	MGD
Annual Average =	194	MGD

Mixing Information

Annual - 1Q10 Mix =	19.84	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	100	mg/L
90% Temp (Annual) =	29	deg C
90% Temp (Wet season) =	19	deg C
90% Maximum pH =	6.9	SU
10% Maximum pH =	6.6	SU
Discharge Flow =	8	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	2.7E+03	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	--	--	na	4.4E+04
Acrolein	0	--	--	na	7.8E+02	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
Acrylonitrile [C]	0	--	--	na	6.6E+00	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	4.9E+00	--	na	3.5E-02	--	--	--	--	--	--	--	--	4.9E+00	--	na	3.5E-02
Ammonia-N (mg/l) (Yearly)	0	3.31E+01	1.97E+00	na	--	5.4E+01	2.8E+01	na	--	--	--	--	--	--	--	--	--	5.4E+01	2.8E+01	na	--
Ammonia-N (mg/l) (High Flow)	0	1.85E+01	2.16E+00	na	--	1.1E+02	3.6E+01	na	--	--	--	--	--	--	--	--	--	1.1E+02	3.6E+01	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.8E+06	--	--	--	--	--	--	--	--	--	--	na	1.8E+06
Antimony	0	--	--	na	4.3E+03	--	--	na	7.0E+04	--	--	--	--	--	--	--	--	--	--	na	7.0E+04
Arsenic	0	3.4E+02	1.5E+02	na	--	5.5E+02	1.8E+03	na	--	--	--	--	--	--	--	--	--	5.5E+02	1.8E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
Benzidine [C]	0	--	--	na	5.4E-03	--	--	na	1.4E-01	--	--	--	--	--	--	--	--	--	--	na	1.4E-01
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	2.3E+02	--	--	--	--	--	--	--	--	--	--	na	2.3E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	2.8E+06	--	--	--	--	--	--	--	--	--	--	na	2.8E+06
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	9.1E+04	--	--	--	--	--	--	--	--	--	--	na	9.1E+04
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	8.5E+04	--	--	--	--	--	--	--	--	--	--	na	8.5E+04
Cadmium	0	3.9E+00	1.1E+00	na	--	6.4E+00	1.4E+01	na	--	--	--	--	--	--	--	--	--	6.4E+00	1.4E+01	na	--
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	3.9E+00	5.3E-02	na	5.6E-01	--	--	--	--	--	--	--	--	3.9E+00	5.3E-02	na	5.6E-01
Chloride	0	8.6E+05	2.3E+05	na	--	1.4E+06	2.8E+06	na	--	--	--	--	--	--	--	--	--	1.4E+06	2.8E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	3.1E+01	1.3E+02	na	--	--	--	--	--	--	--	--	--	3.1E+01	1.3E+02	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	3.4E+05	--	--	--	--	--	--	--	--	--	--	na	3.4E+05

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	8.6E+03	--	--	--	--	--	--	--	--	--	--	na	8.6E+03
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	7.3E+05	--	--	--	--	--	--	--	--	--	--	na	7.3E+05
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	7.0E+04	--	--	--	--	--	--	--	--	--	--	na	7.0E+04
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	6.5E+03	--	--	--	--	--	--	--	--	--	--	na	6.5E+03
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.3E-01	5.0E-01	na	--	--	--	--	--	--	--	--	--	1.3E-01	5.0E-01	na	--
Chromium III	0	5.7E+02	7.4E+01	na	--	9.2E+02	9.1E+02	na	--	--	--	--	--	--	--	--	--	9.2E+02	9.1E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.6E+01	1.3E+02	na	--	--	--	--	--	--	--	--	--	2.6E+01	1.3E+02	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Copper	0	1.3E+01	9.0E+00	na	--	2.2E+01	1.1E+02	na	--	--	--	--	--	--	--	--	--	2.2E+01	1.1E+02	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	3.6E+01	6.4E+01	na	3.5E+06	--	--	--	--	--	--	--	--	3.6E+01	6.4E+01	na	3.5E+06
DDD [C]	0	--	--	na	8.4E-03	--	--	na	2.1E-01	--	--	--	--	--	--	--	--	--	--	na	2.1E-01
DDE [C]	0	--	--	na	5.9E-03	--	--	na	1.5E-01	--	--	--	--	--	--	--	--	--	--	na	1.5E-01
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.8E+00	1.2E-02	na	1.5E-01	--	--	--	--	--	--	--	--	1.8E+00	1.2E-02	na	1.5E-01
Demeton	0	--	1.0E-01	na	--	--	1.2E+00	na	--	--	--	--	--	--	--	--	--	--	1.2E+00	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	4.0E+05	--	--	--	--	--	--	--	--	--	--	na	4.0E+05
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	2.8E+05	--	--	--	--	--	--	--	--	--	--	na	2.8E+05
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	4.2E+04	--	--	--	--	--	--	--	--	--	--	na	4.2E+04
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	4.2E+04	--	--	--	--	--	--	--	--	--	--	na	4.2E+04
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	1.9E+01	--	--	--	--	--	--	--	--	--	--	na	1.9E+01
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	2.5E+04	--	--	--	--	--	--	--	--	--	--	na	2.5E+04
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	2.8E+05	--	--	--	--	--	--	--	--	--	--	na	2.8E+05
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	2.3E+06	--	--	--	--	--	--	--	--	--	--	na	2.3E+06
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	9.8E+03	--	--	--	--	--	--	--	--	--	--	na	9.8E+03
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	2.8E+04	--	--	--	--	--	--	--	--	--	--	na	2.8E+04
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	3.9E-01	6.9E-01	na	3.5E-02	--	--	--	--	--	--	--	--	3.9E-01	6.9E-01	na	3.5E-02
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	--	--	na	2.0E+06
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	3.7E+04	--	--	--	--	--	--	--	--	--	--	na	3.7E+04
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	4.7E+07	--	--	--	--	--	--	--	--	--	--	na	4.7E+07
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	2.3E+05	--	--	--	--	--	--	--	--	--	--	na	2.3E+05
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	--	--	na	2.3E+03
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.6E-01	6.9E-01	na	3.9E+03	--	--	--	--	--	--	--	--	3.6E-01	6.9E-01	na	3.9E+03
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.6E-01	6.9E-01	na	3.9E+03	--	--	--	--	--	--	--	--	3.6E-01	6.9E-01	na	3.9E+03
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	3.9E+03	--	--	--	--	--	--	--	--	--	--	na	3.9E+03
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	1.4E-01	4.4E-01	na	1.3E+01	--	--	--	--	--	--	--	--	1.4E-01	4.4E-01	na	1.3E+01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	1.3E+01	--	--	--	--	--	--	--	--	--	--	na	1.3E+01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	4.7E+05	--	--	--	--	--	--	--	--	--	--	na	4.7E+05
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	--	--	na	6.0E+03
Fluorene	0	--	--	na	1.4E+04	--	--	na	2.3E+05	--	--	--	--	--	--	--	--	--	--	na	2.3E+05
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.2E-01	na	--	--	--	--	--	--	--	--	--	--	1.2E-01	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	8.4E-01	4.7E-02	na	5.3E-02	--	--	--	--	--	--	--	--	8.4E-01	4.7E-02	na	5.3E-02
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	8.4E-01	4.7E-02	na	2.8E-02	--	--	--	--	--	--	--	--	8.4E-01	4.7E-02	na	2.8E-02
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	3.3E+00	--	--	--	--	--	--	--	--	--	--	na	3.3E+00
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	1.5E+00	--	na	1.6E+01	--	--	--	--	--	--	--	--	1.5E+00	--	na	1.6E+01
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	2.8E+05	--	--	--	--	--	--	--	--	--	--	na	2.8E+05
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.5E+01	na	--	--	--	--	--	--	--	--	--	--	2.5E+01	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	1.2E+01	--	--	--	--	--	--	--	--	--	--	na	1.2E+01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	6.6E+05	--	--	--	--	--	--	--	--	--	--	na	6.6E+05
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	1.2E+02	1.4E+01	na	--	1.9E+02	1.7E+02	na	--	--	--	--	--	--	--	--	--	1.9E+02	1.7E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	1.2E+00	na	--	--	--	--	--	--	--	--	--	--	1.2E+00	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	2.3E+00	9.4E+00	na	8.3E-01	--	--	--	--	--	--	--	--	2.3E+00	9.4E+00	na	8.3E-01
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	--	--	na	6.5E+04
Methoxychlor	0	--	3.0E-02	na	--	--	3.7E-01	na	--	--	--	--	--	--	--	--	--	--	3.7E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	3.4E+05	--	--	--	--	--	--	--	--	--	--	na	3.4E+05
Nickel	0	1.8E+02	2.0E+01	na	4.6E+03	3.0E+02	2.5E+02	na	7.5E+04	--	--	--	--	--	--	--	--	3.0E+02	2.5E+02	na	7.5E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	3.1E+04	--	--	--	--	--	--	--	--	--	--	na	3.1E+04
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	3.5E+02	--	--	--	--	--	--	--	--	--	--	na	3.5E+02
Parathion	0	6.5E-02	1.3E-02	na	--	1.1E-01	1.6E-01	na	--	--	--	--	--	--	--	--	--	1.1E-01	1.6E-01	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.7E-01	na	--	--	--	--	--	--	--	--	--	--	1.7E-01	na	--
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	4.3E-02	--	--	--	--	--	--	--	--	--	--	na	4.3E-02

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol [C]	0	6.4E+00	5.8E+00	na	8.2E+01	1.0E+01	7.2E+01	na	2.1E+03	--	--	--	--	--	--	--	--	1.0E+01	7.2E+01	na	2.1E+03
Phenol	0	--	--	na	4.6E+06	--	--	na	7.5E+07	--	--	--	--	--	--	--	--	--	--	na	7.5E+07
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.8E+05	--	--	--	--	--	--	--	--	--	--	na	1.8E+05
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	--	--	na	2.4E+02
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+01
Strontium-90	0	--	--	na	8.0E+00	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Tritium	0	--	--	na	2.0E+04	--	--	na	3.3E+05	--	--	--	--	--	--	--	--	--	--	na	3.3E+05
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	3.2E+01	6.1E+01	na	1.8E+05	--	--	--	--	--	--	--	--	3.2E+01	6.1E+01	na	1.8E+05
Silver	0	3.4E+00	--	na	--	5.6E+00	--	na	--	--	--	--	--	--	--	--	--	5.6E+00	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane [C]	0	--	--	na	1.1E+02	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Tetrachloroethylene [C]	0	--	--	na	8.9E+01	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Thallium	0	--	--	na	6.3E+00	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	--	--	na	1.0E+02
Toluene	0	--	--	na	2.0E+05	--	--	na	3.3E+06	--	--	--	--	--	--	--	--	--	--	na	3.3E+06
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	1.2E+00	2.5E-03	na	1.9E-01	--	--	--	--	--	--	--	--	1.2E+00	2.5E-03	na	1.9E-01
Tributyltin	0	4.6E-01	6.3E-02	na	--	7.5E-01	7.7E-01	na	--	--	--	--	--	--	--	--	--	7.5E-01	7.7E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	--	--	na	1.5E+04
1,1,2-Trichloroethane [C]	0	--	--	na	4.2E+02	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride [C]	0	--	--	na	6.1E+01	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Zinc	0	1.2E+02	1.2E+02	na	6.9E+04	1.9E+02	1.4E+03	na	1.1E+06	--	--	--	--	--	--	--	--	1.9E+02	1.4E+03	na	1.1E+06

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	7.0E+04
Arsenic	2.2E+02
Barium	na
Cadmium	2.5E+00
Chromium III	3.7E+02
Chromium VI	1.0E+01
Copper	8.7E+00
Iron	na
Lead	7.7E+01
Manganese	na
Mercury	8.3E-01
Nickel	1.2E+02
Selenium	1.3E+01
Silver	2.2E+00
Zinc	7.6E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

1/6/2009 4:23:19 PM

Facility = Martinsville STP - VA0025305
Chemical = Ammonia
Chronic averaging period = 4
WLAa = 54
WLAc = 28
Q.L. = .1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

1/6/2009 1:51:28 PM

Facility = Martinsville STP - VA0025305
Chemical = Copper
Chronic averaging period = 4
WLAa = 22
WLAc = 110
Q.L. = 5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 8
Variance = 23.04
C.V. = 0.6
97th percentile daily values = 19.4673
97th percentile 4 day average = 13.3103
97th percentile 30 day average= 9.64842
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

8

1/6/2009 1:52:53 PM

Facility = Martinsville STP - VA0025305
Chemical = Zinc
Chronic averaging period = 4
WLAa = 190
WLAc = 1400
Q.L. = 5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 50
Variance = 900
C.V. = 0.6
97th percentile daily values = 121.670
97th percentile 4 day average = 83.1895
97th percentile 30 day average= 60.3026
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

50

Attachment G

Historical Limit Development

MEMORANDUM

2111 North Hamilton Street

State Water Control Board
P. O. Box 11143

Richmond, VA. 23230

SUBJECT: Smith River Water Quality Management

TO: R. G. Burnley

FROM: W. H. Bishop
W. H. Bishop

DATE: January 29, 1986

COPIES: W. L. Woodfin-DWRPM, L. G. Lawson-OWRM, M. G. Ferguson-OWRM, D. F. Jones-OWRP, M. D. Phillips-OERS, A. J. Anthony-OERS,

INTRODUCTION

The Henry County PSA has submitted an NPDES Application for a new 4.0 MGD sewage treatment plant to serve southern Henry County. The plant will be located 3.4 miles downstream of the existing 6.0 MGD City of Martinsville STP. Previous plans called for expansion of the Martinsville STP to 8.0 MGD together with an expansion of the 4.0 MGD Henry County Upper Smith River (USR) STP to 8.0 MGD. The USR facility is located approximately 6.0 miles upstream of the Martinsville STP. The only other major discharge in this segment is the 1.5 MGD E. I. du Pont facility.

Attached as Figure #1 is a map of the Smith River from the Upper Smith River STP to the Eden, North Carolina Water Treatment Plant. Besides the 3 discharges noted above this segment contains two impoundments 1) Philpott (COE) and 2) City of Martinsville Hydro Project. Both impoundments operate for power generation and provide flood control. Neither is regulated nor is any flow through required. This situation is one of the principal reasons this segment cannot be effectively modeled. To compound this issue the release from Philpott is a bottom withdrawal of very cold water for trout propagation which increases the modeling variables. Modeling possibilities within this segment have been previously considered by OERS personnel (formerly BWCM) and rejected.

Even if modeling for oxygen demanding substances is possible, a number of other parameters which cannot be modeled must be studied for permit consideration. North Carolina has already objected to the existing discharges in this segment, principally Martinsville, in order to protect the Eden water supply approximately 13.5 miles below the Martinsville STP. Details of North Carolina's complaints and the WCRO response are contained in a staff report entitled "Water Quality of the Smith River" dated September, 1985. This report was previously transmitted to OERS and OWRM. Excerpts as necessary are attached.

E-1, 1

NC has complained of taste and odor problems at the Eden water intake and has asked Virginia to place tighter controls on TDS (Total Dissolved Solids), chlorides, conductivity, and phenols. As the staff report indicates, the Martinsville STP is the source of elevated levels of the above parameters although standards are not routinely violated. There are serious questions based upon data supplied by NC that usage of our Public Water Supply (PWS) standards for control of these parameters will relieve the taste and odor problems at Eden.

Recently Eden has complained that the river color is causing color in the finished water. As a result the water treatment plant has had to be shut down for short periods. No taste and odor or chlorine demand was associated with these complaints. In addition, these complaints have come on Sunday and Monday rather than Tuesday. Tuesday Complaints just ahead of the Philpott power slug generated on Monday morning have been the norm. No power is generated on weekends as a rule.

In addition to the individual parameters, "toxics" concerns at the Martinsville STP are well documented. Under the newly proposed treatment scheme a large percentage of the industrial waste being treated by the Martinsville STP will be transferred to the new plant tentatively named Lower Smith River (LSR).

PREVIOUS PLANNING

The Roanoke River Basin (303(e)) Plan originally utilized the TVA Flat Water Equation to calculate assimilative capacities. However, it was recognized that the flow, slopes, and temperatures in this segment were not applicable to that method of determining assimilative capacities. In 1982 the Board approved Amendment #4 to the 303(e) Plan to allow expansion of the Martinsville STP to 8.0 MGD (from 6.0 MGD) and the Henry County Upper Smith River (USR) to 8.0 MGD (from 4.0 MGD).

The approved allocations are listed below. The concentrations cited are for 8.0 MGD.

	STP	Allocation	Allowable Effluent Concentration of Design Flow
1.	Martinsville	1500 lbs/d	24 mg/l
	USR	1134 lbs/d	17 mg/l
	E.I.du Pont	503 lbs/d	

E-1, 2

IRGINIA WATER CONTROL BOARD

MEMORANDUM

File

P. O. Box 7017 Roanoke, Virginia 24019

SUBJECT: Lower Smith River

TO: Robert G. Burnley, Regional Director, WCRO

FROM: William H. Bishop, Regulatory Services-WCRO

William H. Bishop, Jr.

DATE: May 30, 1986

COPIES:

The limits below are proposed for the Lower Smith River STP's draft permit. The rationale for the limits follows. Additionally, future considerations for the Martinsville STP are also included due to the need to allocate the streams assimilation capacity between these two discharges.

	Lower Smith River	Martinsville (Future)
Flow -	4.0 MGD	8.0 MGD
BOD -	17 mg/l	22.5 mg/l
TSS -	30 mg/l	30.0 mg/l
Cl_2 -	0.21 mg/l	0.09 mg/l
D.O. -	4.5 mg/l	- -
Color -	60 units	172
TDS -	3630 mg/l	3630
Chlorides-	1815 mg/l	1815
MBAS -	4.13 mg/l	4.13
Phenols -	8.3 ug/l	8.3 ug/l
Sulfates -	2,065 mg/l	2,065 mg/l

Flow - The existing permit application is for a 4.0 MGD discharge. Future consideration of 6.0 MGD is being addressed for all parameters except flow. Since flow is not an actual NPDES permit limitation, 6.0 MGD could be discharged without permit modification if all other limits are met. The Board will still have some options for flow control under the "Policy for Sewage Treatment Plant Loadings".

BOD - As has been discussed in several briefing memos, there is no model available at this time to estimate the assimilative stream capacity. The TVA Flat Water Equation was used in the Roanoke River Basin Water Quality Management Plan for estimating purposes. Inputs to the Smith River currently include an allocation of 1500 lbs/D BOD for the Martinsville STP, 1134 lbs/D for the Henry County Upper Smith River STP, and 500 lbs/D for the DuPont STP.

This permit reallocates 1/2 of the Upper Smith River STP allocation to the Lower Smith River STP. This reallocation will be conditioned upon the maintenance of stream standards. A permittee operated monitoring program will be used to verify water quality. The Roanoke River Basin Water Quality Management Plan is being simultaneously revised to allow this reallocation. If an appropriate model is successfully run on this stream segment, the WQMP and this permit will have to be revised.

(X)

E-1, 3

TSS - There are no water quality limits associated with TSS. A technology minimum for POTW's of 30 mg/l has been assigned.

Cl_2 - These limits are based upon the Board's currently proposed standard of 11 ug/l. Complete mix and no background residual are assumed. The county has discussed relief from this control for the USR STP based upon the lack of measurable residuals below the outfall. Relaxation of this limit will probably be requested by the county for this discharge as well.

D.O. - To satisfy non-degradation a D.O. drop of no more than 0.2 mg/l at the mix point was used. An effluent D.O. of 3.3 mg/l is needed at 4.0 MGD and 4.5 at 6.0 MGD for the Lower Smith River to maintain this standard. Usage of the 6.0 MGD allocation provides the county with a realistic design objective. It is possible that no actual post aeration equipment will be requierd to meet this D.O. level.

The Martinsville STP has no D.O. limit although it does have post aeration. A file search to provide background on this issue will be conducted as soon as possible.

Color - Based upon the recommendation of the State Department of Health, a limit of 15 color units in-stream is being considered for permit preparation. This agrees with the Water Quality Standards allowance for use of potable water limits if conventional water treatment does not remove the pollutants in question.

Since the River Basin Section Table for Section 3g, PWS, just below the discharge does not indicate any special limitations, the standard intake limits for protection of a Surface Public Water Supply will be used. To determine intake limits at Eden the 7 day/10 year low flow at the Fieldcrest Mills water intake at Eden has been utilized. The Smith River USGS gage is located very near this intake and will be used as the intake point. The 7 day/10 year low flow at Eden is 157.7 cfs and at Martinsville, it is 109 cfs. The 1 day/20 year low flow at Eden is approximately 1/2 of the 7 day/10 year flow. On that rare occasion, Fieldcrest Mills will have to improve treatment or purchase water from Eden.

The following mass balance has been used to determine discharge concentrations for each conservative pollutant under consideration including color.

Eq #1

$$C_s Q_s = C_1 Q_1 + C_2 Q_2 + C_3 Q_3 + C_4 Q_4$$

C_s = concentration at Eden
Q_s = flow at Eden (101.7 MGD + C_1 + C_2)
C_1 = concentration of #1 discharge
Q_1 = flow of #1 discharge
C_2 = concentration of #2 discharge
Q_2 = flow of #2 discharge
C_3 = background concentration
Q_3 = background flow
C_4 = concentration of additional flow in stream between Martinsville and Eden.
Q_4 = additional flow between Martinsville and Eden.

(X)

Color Calculation Inputs and Outputs

Case #1

$C = 15$ c.u. $\quad C_1 = 60 \quad C_2 = \quad C_3 = 0 \quad C_4 = 0$

$Q_s = 101.7$ MGD $\quad Q_1 = 4.0$ MGD $\quad Q_2 = 6.0$ MGD $\quad Q_3 = 70.3$ MGD $\quad Q_4 = 31.4$ MGD

$(101.7 + 6.0 + 4.0)15 = 60(4) + 6C_2 + 0 + 0$

$C_2 = 239$ c.u.

Case #2

$Q_1 = 6.0$ MGD
$Q_2 = 6.0$ MGD
$C_2 = 224$ Color Units (c.u.)

Case #3

$Q_1 = 6.0$ MGD
$Q_2 = 8.0$ MGD
$C_2 = 172$ Color Units (c.u.)

Case #3 displays a future (8.0 MGD) color concentration for the Martinsville STP of 172 c.u. and allows a concentration of 60 c.u. at 6.0 MGD for the Lower Smith River STP. This approach sets a technology limit of 60 c.u. for new facilities. The 6.0 MGD used above allows reserve for some future expansion of the Lower Smith River facility.

The remainder of the color is allocated to the City of Martinsville. The concentration of 172 units is recommended for all flow levels. No appreciable cost differential is anticipated to achieve 172 units versus 224 units. If a cost differential is discovered, a new allocation rationale may have to be developed.

Modifications due to cost may not impact upon the 60 c.u concentration at the Lower Smith River facility. Martinsville could be allowed a tiered permit until it reaches 8.0 MGD although this is not a desirable approach from an operational or regulatory view point. In addition, if appreciable background exist in the future, a reallocation including the Upper Smith River and DuPont may have to be considered.

TDS - Eg #1 will be employed again. However, no technology limit is assumed. Background TDS currently exist considerably less than 100 mg/l. 100 mg/l is still recommended to allow a future reserve and a margin of safety in the downstream allocation. The current background data is not at low flow.

(X)

E-1, 5

The following inputs were used for determining this allocation

Case #4

$C_s = 500$ $C_1 = C_2 = C$ $C5 = 100$ $C_4 = 0$

$Q_s = 101.7$ $Q_1 = 4.0$ $Q_2 = 6.0$ $Q_3 = 70.3$ $Q_4 = 31.4$

C = 4,880 mg/l

Case #5

$Q_1 = 6.0$ MGD

$Q_2 = 6.0$ MGD

C = 4,150 mg/l

Case #6

$Q_1 = 6.0$ MGD

$Q_2 = 8.0$ MGD

C = 3630 mg/l

Case #4 illustrates the necessary controls to put on the Martinsville STP and Smith River STP at immediate conditions to satisfy the Public Water Supply Standard of 500 mg/l TDS using 100 mg/l TDS background.

Case #5 and #6 were calculated to display the limitations considering future growth. Case #6 is recommended for design of the LSR STP and for permit limitations. If the background concentration increases unexpectedly, future modification to this limitation will be necessary.

Chlorides - For chlorides, a downstream concentrate of 250 mg/l is required. A background concentration of 50 mg/l is conservatively estimated. Using these concentrations, the chloride limitation is exactly 1/2 of the TDS.

Chlorides = 1815 mg/l

Chromium (Total), Copper, Foaming Agents (MBAS), Phenols, Sulfates, and Zinc may also be in this wastewater. Using the PWS standards and the same rationale as used for calculating limits of TDS and chlorides, the above parameters were examined. No background was assumed. The following levels of discharge were estimated based upon a discharge of 6.0 MGD from the LSR and 8.0 MGD from the Martinsville STP

(X)

The following levels of discharge were estimated based upon a discharge of 6.0 MGD from the LSR STP and 8.0 MGD from the Martinsville STP.

	In-Stream (mg/l)	Effluent Concentrations for LSR = 6.0 MGD and Martinsville = 8.0 MGD
Chromium	0.05	410 ug/l
Copper	1.00	8.26 mg/l
Foam	0.50	4.13 mg/l
Phenols	.001	8.3 ug/l
Zinc	5.0	41.3 mg/l
Sulfates	250	2,065 mg/l

Based upon the river monitoring program, a limit on phenols of 8.3 ug/l is recommended. Additionally, given the past history of foam on the Smith River, a limit on MBAS of 4.1 mg/l is recommended. Sulfate limits are recommended due to the type of industry being serviced. There is no indication of any need to limit any of the other parameters.

Quantities

All the above concentrations were converted to quantities (or equivalents) based upon a flow of 4.0 MGD at the Lower Smith River STP. This approach allows an acceptable margin of safety. A final recommendation to allocate the remainder of the stream capacity to the Lower Smith River when expanded to 6.0 MGD will be judged against the information on hand at that time.

TMPs

If these limits prove to cause toxicity problems, the Water Quality Standards would allow further modifications of the limits. Chromium, copper, and zinc are included in the State Water Control Board's Water Quality Criteria and may be appreciably lower than the PWS limits.

WHB/vcm

(X)

E-1, 7

standards for application to specific drinking water sources. Because some pollutants are not significantly removed by conventional water treatment systems, and to insure protection of the water supply, the stream standards for those pollutants are the same as the limits required for protection of public health in the finished drinking water.

In order to emphasize the need to protect a specific body of water for use as a source for a public water supply, each such area has been designated as a separate section in the River Basin Section Tables of Section 4. The section usually begins at the intake point and usually extends 5 miles upstream. (If a watershed is not significantly larger than 5 miles above the intake the water supply section may include the entire upstream watershed to its headwaters.) This designation as a separate section is primarily an administrative method of pointing out a water supply source and emphasizing the need to protect the stream.

The public water supply standards usually apply only at the raw water intake point. Of course, the upstream water quality must be such that specific limits will be met at the intake point. In cases where the specific numeric limits are adopted to apply for some additional upstream distance to provide further protection for the water source, the section description in the River Basin Section Tables will indicate this fact and point out the additional distance. Lacking such special notation, the public water supply standards apply only at the intake point.

Public Water Supply Standards and Protection of Aquatic Life

The Public Water Supply Standards are designed to protect water quality for human consumption. These limits, however, in some cases may not be sufficient to protect aquatic life. Many aquatic organisms are more sensitive to certain pollutants than humans and would, of course, be under constant exposure to any such pollutant in their environment. Therefore, when the Board considers classifying a body of water as a public water supply, an evaluation of the aquatic community in that area is made to determine if water quality concentration limits must be more stringent for any particular parameter to protect the aquatic community. (The concentrations for those pollutants that are marked with an asterisk (*) are the ones most likely to be too high to protect aquatic life, although adequate to provide protection for human consumption.) This procedure will ensure that any specific numeric limits adopted as enforceable standards for a public water supply will be stringent enough to protect aquatic life.

2.03 Surface Water Standards for Surface Public Water Supplies

In addition to other standards established for the protection of public or municipal water supplies, the following standards will apply at the water intake and, if determined to be appropriate, for a distance upstream, and in the case of the streams influenced by tidal action, downstream also. This distance from the intake is to be determined on a case-by-case basis by the Board considering upstream wastewater volume, receiving stream volume and other appropriate physical, chemical and biological factors. The standards will apply to both the water supply stream and its tributaries within the designated distance. (In case of existing water supplies, the standards will apply at the intake point until further change is made.)

CONSTITUENT	CONCENTRATION (MG/L)
Arsenic	0.05
Barium	1.0
Cadmium*	0.01
Chloride	250
Chromium (Total)	0.05
Copper*	1.0
Foaming agents (measured as methylene blue active substances)	0.5
Iron (soluble)	0.3
Lead	0.05
Manganese (soluble)	0.05
Mercury*	0.002
Nitrate (as N)	10
Phenols	0.001
Selenium*	0.01
Silver*	0.05
Sulfate	250
Total dissolved solids	500
Zinc*	5.0

E-1, 8

Subject: Smith River - Z' Color Units ✓

To: Bob Burnley

From: W. H. Bishop

9-16-82

cc: A. Hammer, W. C. Woodfin

Assumed:

1. EDEN Low flow - 101.7 MGD
2. LSR Discharge - 6.0 MGD
3. MART Discharge - 8.0 MGD
4. No Background

Equal Allocation

LSR Conc. = MART. Conc. = 200 C.U.

Flow Proportional

LSR Conc = 231 c.u.

MART Conc = 173 c.u.

Verify:

1. $231(6) - 173(8)$

$1386 \approx 1384$

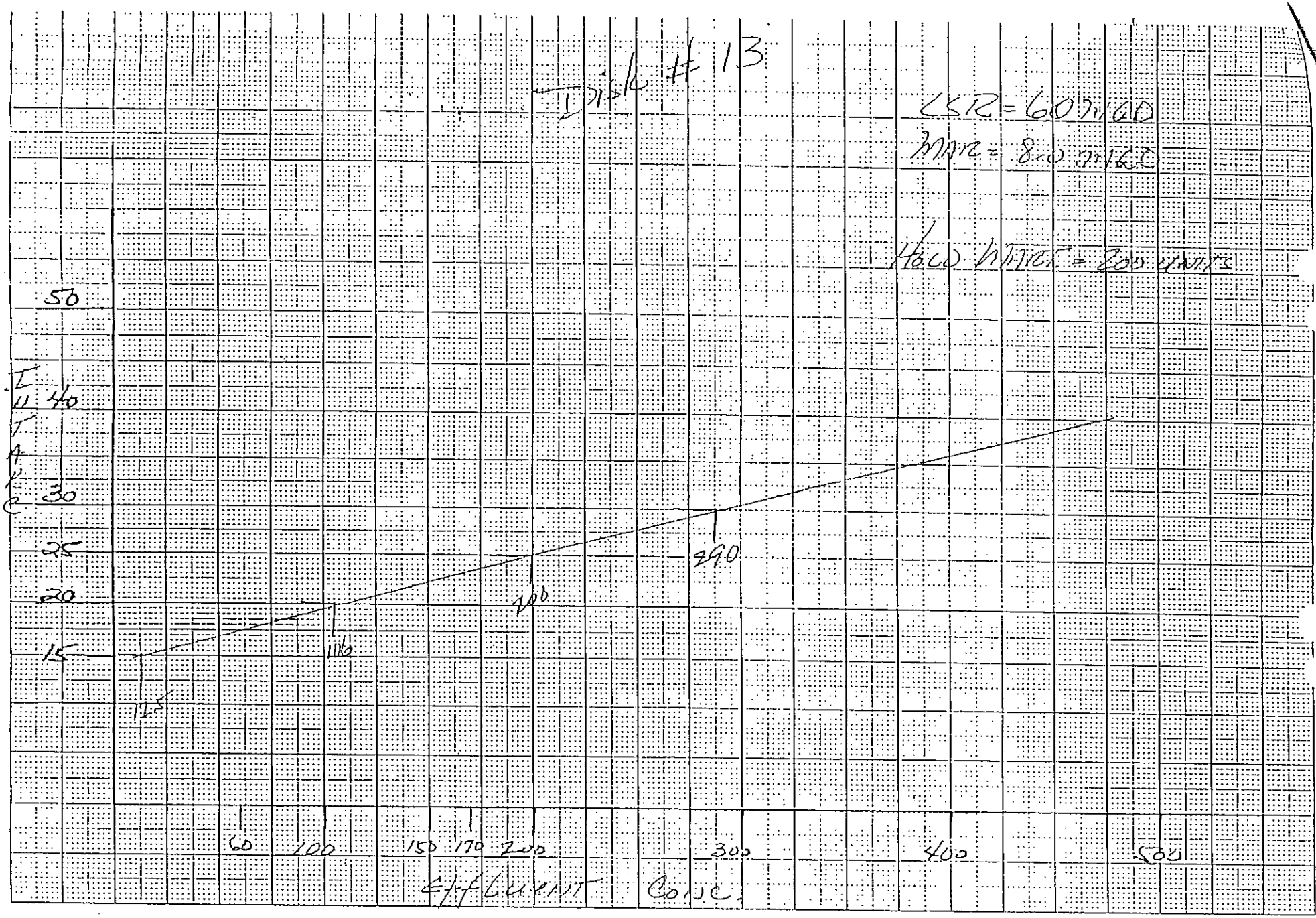
2. Equal Allocation agrees with J. Warwick's letter of 7-25-86.

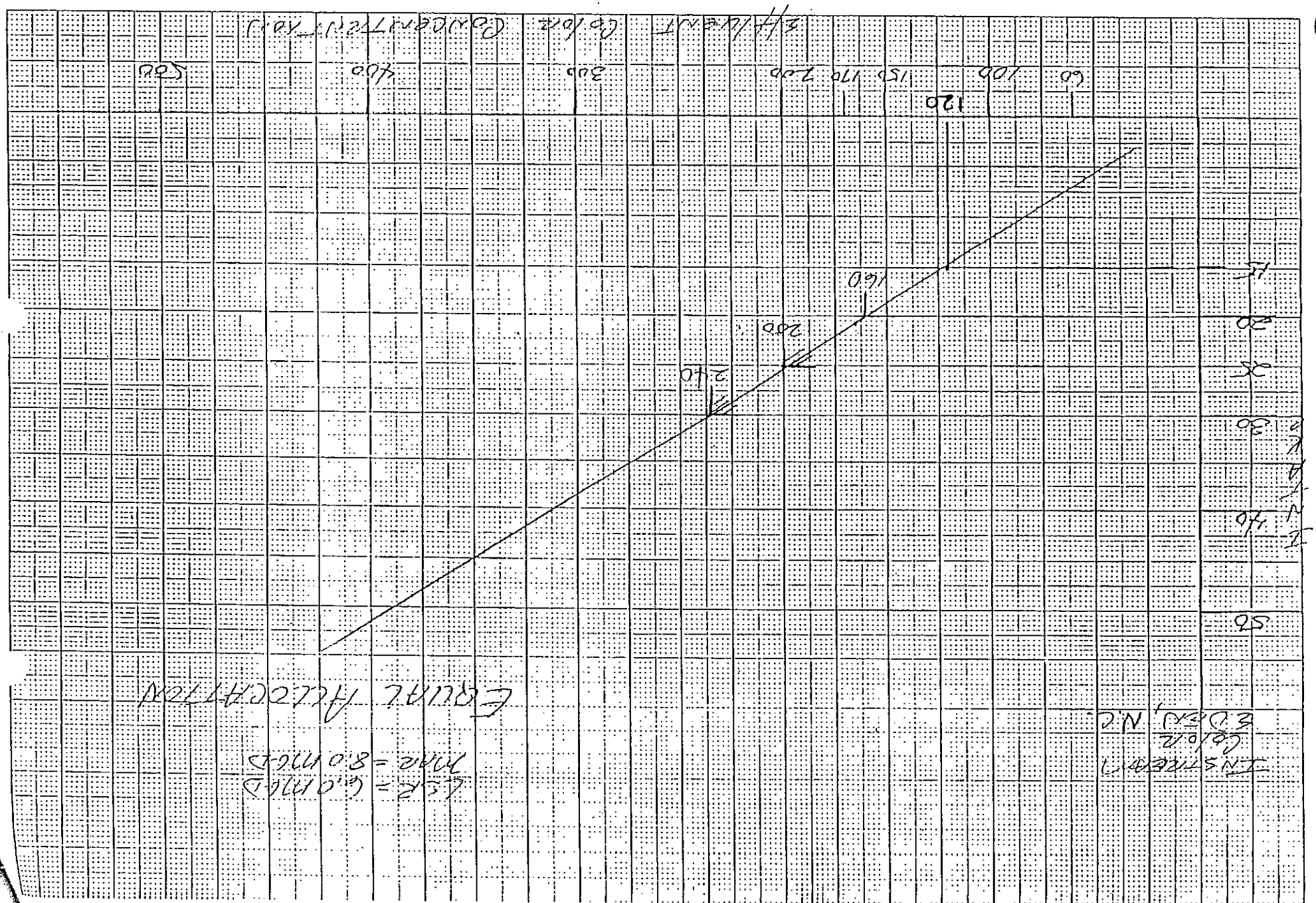
* NOTIFIED WCW 9-16-82

** J. WARWICK To submit 24 hr. RATIONALE by 9-17-82

Assume delivery 9-18-82

E-1,9




60
120
160
200
240

APPENDIX III-1 (Cont.)

PART C

Part C is to be used to record changes in the permit (1) from the previously issued permit and/or (2) during the permit processing period.

NPDES PERMIT PROGRAM
Permit Processing Change Sheet

1. Effluent Limits and Monitoring Schedule: (List any changes and give a brief rationale for the change).

Outfall No.	Parameter Changed	Monitoring Limits Changed From	To	Rationale	Date and Initial
001	Color	NA	200		
	MBAS	NA	93.75 Kg/D	ATTACHMENT C	
	TDS	NA	82,000 Kg/D		
	Chlorides	NA	41,000 Kg/D		
	Sulfates	NA	46,900 Kg/D		
	Phenols	NA	0.19 Kg/D		
	Chlorine Residual	1.0	0.1 mg/L at 6.0 MGD		

001	Color	NA	200 *	ATTACHMENT C	MARTINSVILLE STP @ 8.0 MGD
	MBAS	NA	125 Kg/D		
	TDS	NA	110,000 Kg/D		
	Chlorides	NA	55,000 Kg/D		
	Sulfates	NA	62,500 Kg/D		
	Chlorine Residual	1.0	0.1 mg/L		

*INCREASE TO 300 ADMI IN 1996 BASED ON JUSTIFICATION PROVIDED BY PERMITTEE

PROPOSED AMENDMENT TO THE ROANOKE RIVER BASIN 303(e) WATER QUALITY MANAGEMENT PLAN

Part 1 of 4 Chapter IV "Stream Loading Capacities, Section C. Waste Load Allocations and Suggested NPDES Permit Numbers", Table 21 titled "Loadings and Allocations for Significant Dischargers for Selected Alternative Roanoke River Basin Water Quality Management Plan" pages 221 and 222.

	Date 1982 through 2020
WQMA X11 Study Area: Smith River Upper Smith River STP	
Design Flow (mgd)	~~8.0~~ 4.0
*BOD_5 (lbs/day)	~~1,134~~ 567
*Suspended Solids (lbs/day)	~~1,134~~ 567
*Nitrogen (lbs/day)	
*Phosphorus (lbs/day)	
WQMA X11 Study Area: Smith River E. I. DuPont[1]	
Design Flow (mgd)	N/A
*BOD_5 (lbs/day)	503
*Suspended Solids (lbs/day)	541
*Nitrogen (lbs/day)	
*Phosphorus (lbs/day)	

PROPOSED AMENDMENT TO THE ROANOKE RIVER BASIN 303(e) WATER QUALITY MANAGEMENT PLAN

WQMA X11	
Study Area: Smith River	
Martinsville STP	
Design Flow (mgd)	8.0
*BOD_5 (lbs/day)	1,500
*Suspended Solids (lbs/day)	1,500
*Nitrogen (lbs/day)	
*Phosphorus (lbs/day)	

(Add the following entry)

WQMA X11	
Study Area: Smith River	
Lower Smith River STP	
Design Flow (mgd)	4.0
*BOD_5 (lbs/day)	567
*Suspended Solids (lbs/day)	1,000
*Nitrogen (lbs/day)	
*Phosphorus (lbs/day)	

Notes:

* Presented in this table are the existing waste loads and future allocations. BOD_5 is the only constituent for which allocations are established, other major components are presented as suggested NPDES Permit numbers. Please refer to page 210, Part 1 of 4; Roanoke River Basin, Water Quality Management Plan for further text.

* Includes all facilities.

Part 3 of 4 Chapter VI "Water Quality Management Plan, Smith River Study Area" page 788. Omit the second paragraph (shown below).

~~Based on the above analysis, previous reports, and local opinion, alternative #2 is the selected plan at the City of~~

Attachment H

TMP Justification Memorandum

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WEST CENTRAL REGIONAL OFFICE

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: TMP for Permit Reissuance for Martinsville STP - VA0025305

TO: Permit File

FROM: Kevin Harlow, WCRO

DATE: December 23, 2008

COPIES: D. Debiasi, TMP File

General Information

The City of Martinsville Sewage Treatment Plant (STP) is an extended aeration secondary treatment plant that has a monthly average design flow of 8.0 MGD. The plant discharges to the Smith River.

The current permit requires annual monitoring using a 24-hour flow proportioned composite sample of final effluent from Outfall 001 with Ceriodaphnia dubia used as the test species. The collected data indicates a lack of toxicity during the 2004 permit term.

Test Date	LC50	TUa	100% Surv
8/6/2005	>100%	<1.0	100%
8/5/2005	>100%	<1.0	100%
8/3/2006	>100%	<1.0	100%
8/17/2007	>100%	<1.0	100%

Recommendations - Biological Testing

Outfall 001
It is recommended that the annual compliance testing continue with the previously identified species of Ceriodaphnia dubia for acute testing due to the facility's status as a major discharger with a pretreatment program.